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MUNICIPAL ENGINEERING

The World's Leading Municipal Publication

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EDITORIAL

THE NEW MUNICIPAL ENGINEERING

With this number the change in size of page of Municipal Engineering, which has been in contemplation for some time, is made effective. A material improvement in the internal appearance of the magazine has been made and the cover, while more fixed in content and appearance, is not a retrogression.

A few subscribers prefer the magazine size, which has been followed rather closely since the fourth volume, but it is believed that the majority will be satisfied with the change when they see the improvements which accompany it. Of course the advertisers like it, their opportunity for display is so much improved.

The difficulty arising from changing the size in the middle of the volume can be met by binding the present volume in two parts. This office meets it, however, by binding the first three numbers in the same book with the preceding volume and the next three numbers in the same volume with the last six months of the year.

Other improvements are in contemplation and will be made as rapidly as the improvement in business conditions will warrant.

PROSPECTIVE MUNICIPAL IMPROVEMENTS

The tables of work in prospect for the year 1915 given in this number as the annual estimate of the demands upon contractors for public improvements show that the states, cities and counties of this country will not be idle this year.

A comparison with last year's tables shows several interesting facts. It will be seen that the number of cities reporting work in prospect is materially shorter than last year's list. This is due to two conditions: The first is that no work is to be done. Not a few cities have made this report and it is probable that a considerable number of the failures to report are due to the fact that the city engineer prefers not to report that the city is to do no work. The second is that some cities are slower than usual in deciding what work they will do this year and so the reports do not arrive in time for inclusion in these tables.

It is natural that taxpayers should object to the imposition of improvement taxes when their income is supposed to be somewhat uncertain, and that all should consider the increase in the rates of bond issues. If bonds are issued they will be paid in later years, when the present unpleasantness has passed, so that the advantages of constructing public works at the present time should have great weight in overcoming the disinclination to issue bonds. The real question is as to whether these advantages will reduce the cost enough to make up for the increase in interest charges. This question must be answered for each individual locality, but the probability is that present prices for labor and materials will not continue long. The most far-seeing financiers believe that the increased rates for money will probably last for a long time. The present demands for capital for war purposes will be succeeded by large demands for capital to repair the ravages of war and to put old and new industries on their feet, so that the available money will be working overtime to keep up with the demand. Municipal bonds are now favorites in the market and can usually be placed readily, tho a good many bids have been rejected because the interest demanded was too high. The opinion of financial authorities generally is strongly in favor of the immediate issue of bonds for public improvements as in the long run most economical. They do, however, advise against undertaking improvements which are really not needed for some years to come.

The amount of county road work to be done is very materially larger than last year. This is doubtless due to the rapid increase during the past few years in the sentiment in favor of really good roads, which has culminated in a greatly increased demand for construction, which may continue to increase for several years. This demand has overcome the handicaps which the cities have had, and has resulted in the larger amount of work in prospect for this year. County and township bonds are quite as salable as city bonds and large amounts are placed on the market each month.

IMPROVEMENT OF POGUE'S RUN

INDIANAPOLIS, INDIANA

Pogue's Run has long been one of the troublesome drainage problems of Indianapolis. The plans for track elevation thru the center of the city have finally demanded a solution. This article sketches the methods of design and construction adopted, the photographs making a large part of the showing.

POGUE'S RUN is a small stream running thru the central portion of the city of Indianapolis, Ind., from northeast uthwest and discharging at present into White river near the southern boundary of the city. It was the natural location of the railroads entering the city from the east and northeast and the Union Station is located in part over the stream.

Low water in the run shows scarcely 5 cubic feet of water flowing per second, while freshets have increased the flow at times to 3,000 cubic feet a second. Old bridges carrying streets over the stream, the arches carrying it under the Union Station and under other buildings, the walls and superstructures carrying the railroads along and over it, have obstructed its flow to a greater or less extent, and its improvement has been discussed for twenty or thirty years.

Track elevation has been delayed by differences of opinion as to the improvement of the stream and the lowering of its bed if the streets were to be depressed to any extent in separating the grades, but finally the administration preceding the present incumbents worked out an agreement with the railroads by which the improvement of the run and the reconstruction and enlargement of the Union Station train sheds and appurtenances should be parts of the track elevation plans and paid for by the companies and municipalities interested in the proportions fixed by law. It was also provided that the run should have its bed lowered some 4 to 6 feet where it passed under the tracks to be elevated and part of the streets should be depressed corresponding amounts.

When the present administration took the matter up it found the contract with the railroads made, but has succeeded in keeping the streets practically at their present grades and has somewhat enlarged the dimensions of the concrete structure to carry the waters of the run at the rather flat grades of 0.15 and 0.20 per cent.

The twin concrete conduits of the new structure follow the bed of the run except for a thousand feet or so above Washington street and a similar distance near the Union Station, where it follows Meridian street and an alley for 3 or 4 blocks instead of running under the Union Station and other buildings as at present. It also leaves the present course of the run where that stream turns south and continues directly west on a much shorter route to the river, as described below.

The drain follows the old line of Pogue's Run to Ohio street, then it parallels the C., C., C. & St. L. tracks nearly to Washington street, where it again follows the old bed until it crosses Pennsylvania street. Here it runs across to Meridian street, down Meridian to Merrill street, then to the old site of the run at the alley west of Meridian. It then follows the run to Norwood street, where it again leaves the old line and runs in a westerly direction to White river just south of the Kentucky avenue bridge.

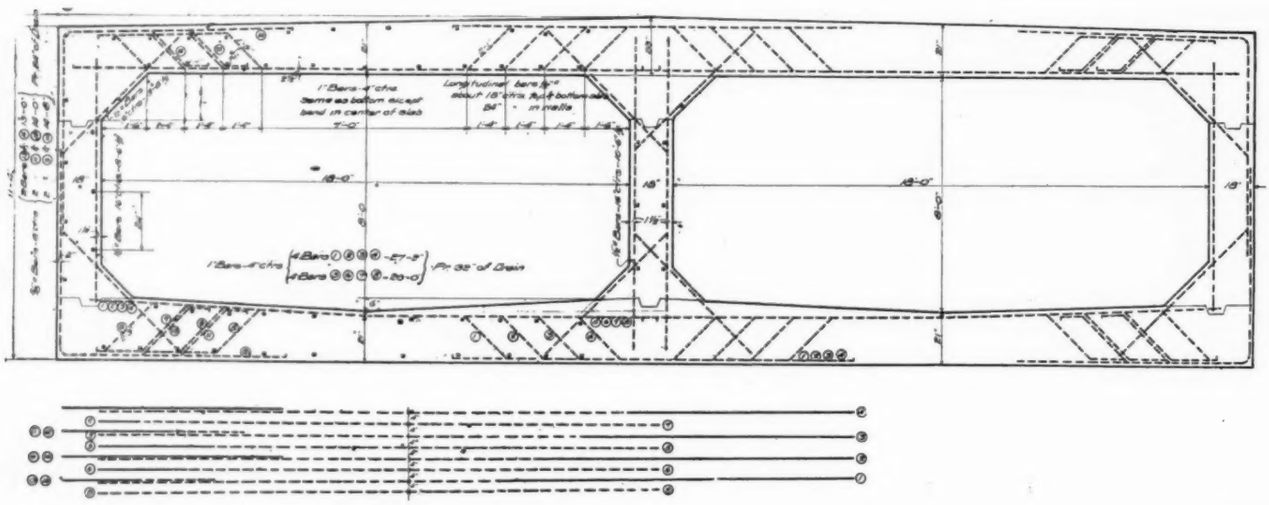
The drain consists in general of two boxes each 8 feet high and of 18-foot span, built of reinforced concrete and connected by "equalizers," openings in the center wall every 100 feet. These openings are 5 feet by 6 and the form and method of reinforcing are shown in one of the photographs. The bottom and top slabs vary from 19 to 34 inches in thickness. The walls are 18 to 20 inches in thickness. There is a heavy section where the drain runs under the Vandalia siding and another where it runs under the Illinois Central tracks; also where the run parallels the C., C., C. & St. L. Railway.

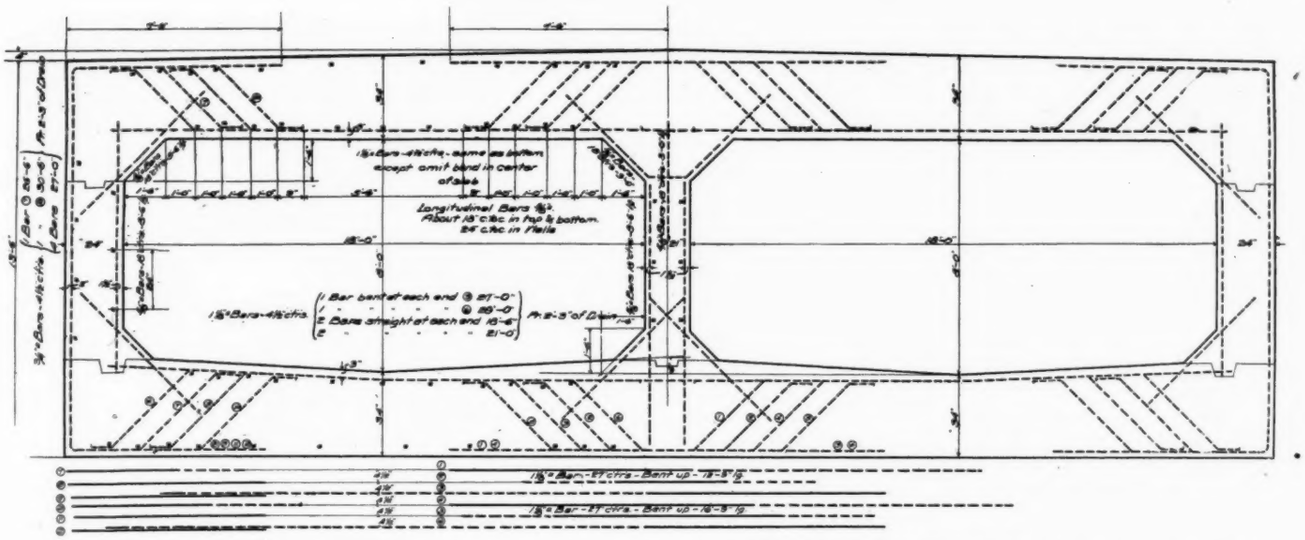
The contract includes the replacing of all pavements by the contractor, the removal of bridges and connecting the ends of pavements where bridges formerly were.

The excavating is being done with a Browning hoist with steam shovel attachment. It consists, as a rule, in the old bed of the run, of some slime, below which is sand and gravel. Where it is suitable this gravel is being used in the concrete.

The reinforcements consist of steel rods of ½-inch to 1½-inch diameter, which are unloaded and bent to the proper shape in a yard near the work. It is reported that the cost

DIMENSIONS AND LAYOUT *of reinforcement for the double conduit are shown in this drawing, which also gives the standard measurements for the full size of cross-section.*





THE HEAVIEST SECTIONS *of the conduit walls and the floor and roof slabs are found under the railway crossings, where the weights to be carried are heaviest. The thickness and amount of reinforcing varies at different cross-sections between the extremes shown in the two drawings, as the special conditions of each locality demand.*

of unloading, bending and stacking is about $1 per ton. The steel is placed in position and wired, at night, by a crew consisting of a foreman and ten men, at an estimated cost of from $2.50 to $3.00 per ton. This crew can place from 20 to 25 tons in a night. The steel requirements vary in the different sections, being quite heavy under the railroad crossings. The lighter sections run below 900 pounds of steel per linear foot of the drain, while the heaviest runs 2,460 pounds per linear foot. In such sections the specifications call for only a straight (not twisted) deformed square bar for the main transverse reinforcing, in order to have as great a space as possible between the bars on account of the extra heavy reinforcing.

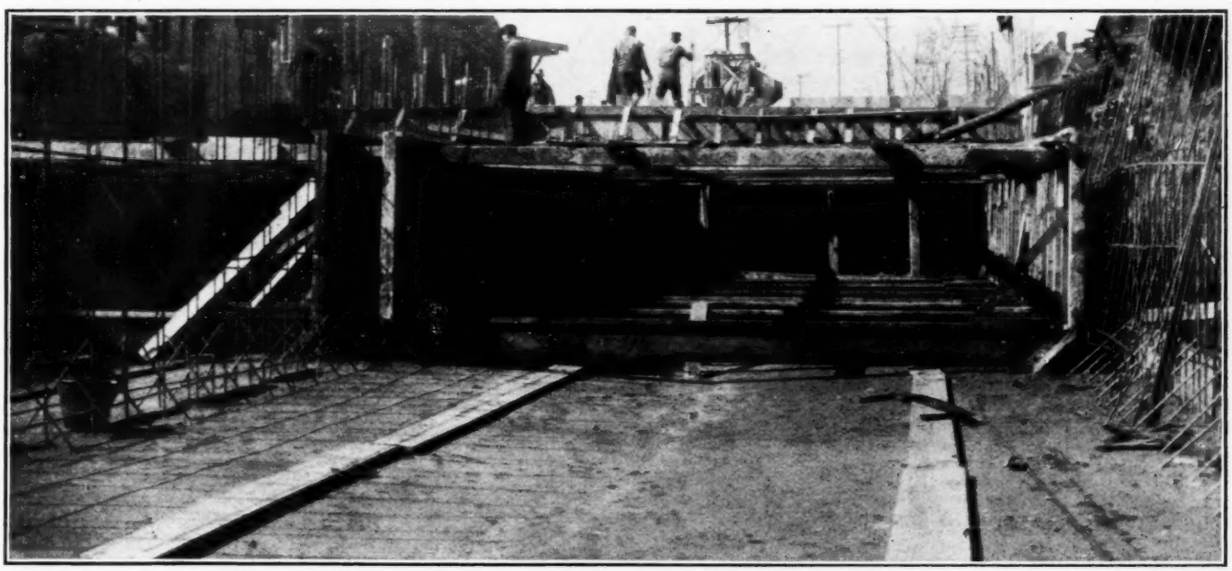
The floor is concreted from a 40-foot tower with a ¾-yard Lakewood mixer, with 40 feet of spouting from the dump, which is 30 feet high. The contractor has concreted 80 lineal feet of flooring in a short day by dragging the concrete some at the start of the run.

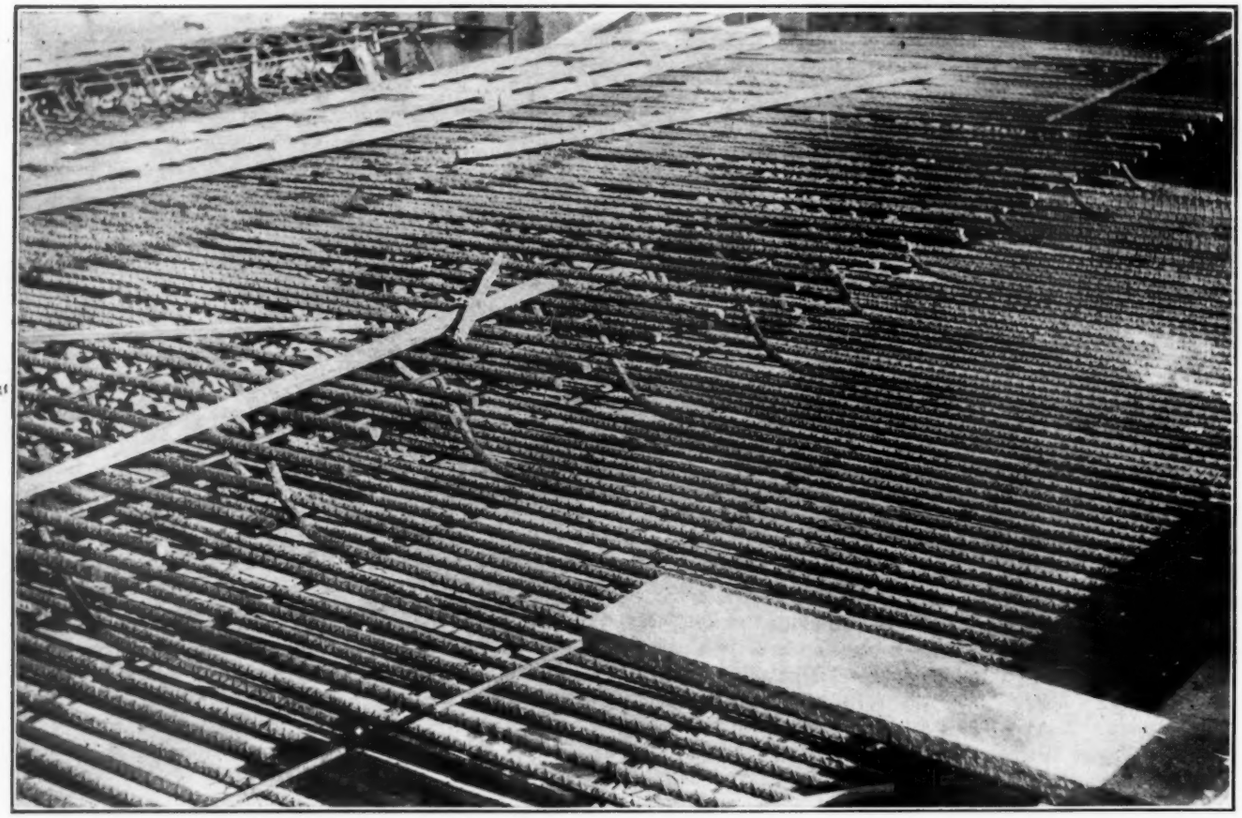
The tower is placed in the bottom of the trench just ahead of the day's run contemplated. The material is hauled to it by a dinky engine, which runs on the top of the bank. It is dumped into the ditch and wheeled to the mixer in wheelbarrows.

The walls and top slab are run from a mixer placed on top of the completed drain and just behind the day's run. The concrete is pushed by hand in dump cars from the mixer to the work.

The wall forms are lined with galvanized iron and are made in sections that are used over and over. Some of these

END VIEW OF FORMS *in place for roof slab over one-half of the double conduit. In the foreground is the completed floor; on the left the reinforcement is in place for the wall between the two conduits; on the right the reinforcement for one side wall. The mixer gang is at work placing concrete for the walls and roof slab.*





HEAVY ROOF REINFORCEMENT *in place. Compare with drawing of cross-section to see the location of reinforcement near bottom of slab in centers of spans, near top and bottom of slab over center wall and near outside walls, and the connection of the two systems of reinforcement by occasional bent bars regularly spaced.*

sections are shown ready to place in one photograph. The concrete in the floor and walls is 1:2½:5 and in the top slab is 1:2:4.

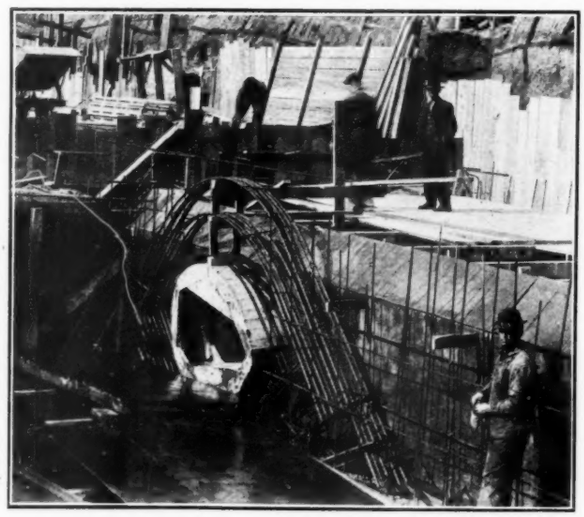
Concreting was commenced on September 5, 1914, and by February 1, 1915, there had been placed 8,514 cubic yards of 1:2:4 concrete and 11,722 cubic yards of 1:2½-5 concrete and 1,800 tons of steel, being an average of 136 yards of concrete and 12 tons of steel a day including Sundays. The lower mixer is run by steam power and the upper by electric.

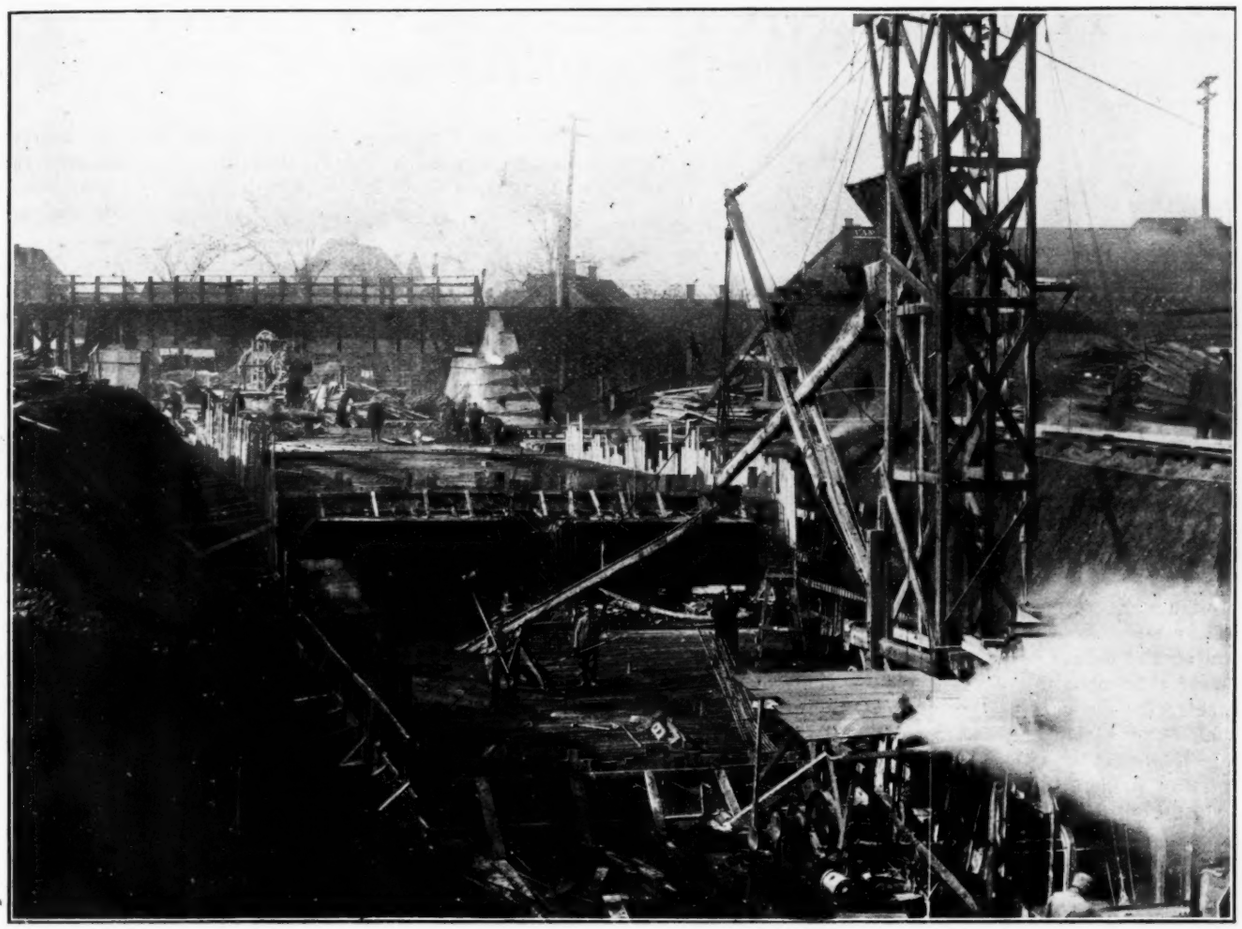
The top of the roof slab is trowelled smooth and waterproofed with one coat of coal tar, one coat of pitch, then three layers of felt with pitch in between.

The plans have been in formation for a number of years, but the contract with the Union Railway Company was formulated and signed under the direction of H. W. Klausmann, former city engineer. The modified plans, under which the work is being constructed, were made under the direction of the present city engineer, B. J. T. Jeup. D. C. Hayne is assistant city engineer, having the construction work under his supervision. Frank C. Lingenfelter has had the working out of the plans as his particular duty during the whole period of their formulation into their present shape. J. W. Stearns is the engineer in direct charge of the construction work and Dunn & McCarthy, of Chicago, are the contractors. The amount of the contract as let was $907,000, but extras for supporting buildings and the like during construction were estimated at $31,000 and it is probable that the ultimate cost will be practically one million dollars.

The contract for the improvement of the run is one of the track elevation contracts and is handled by the city. The contracts for track elevation proper are to be handled by the Union Railroad Company. A settlement at the close of the work will show which party has expended the most money and must reimburse the other.

REINFORCEMENT ABOUT RELIEF OPENINGS *in wall between the twin conduits. Careful study of the photograph will show the system used to carry the weight above down to the foundation around the openings.*

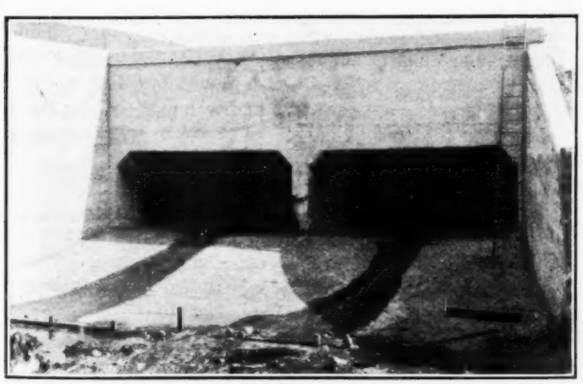




Attention is called particularly to the large photograph on this page which shows the lay-out of the work while in progress. Actually, the mixer in the foreground is operated first to lay the floor and while it is moving forward ready for another day's work the walls and roof are placed over a previous day's work of floor by the mixer in the background, which then takes its turn at moving forward. In this way the concreting gang is kept busy at one mixer or the other all the time and there is no waiting either for setting of concrete or for moving of mixers. The result is large records for concrete placed per day and rapid forward movement of the completed work.

COMPREHENSIVE VIEW OF WORK *in progress on Pogue's Run Improvement. In the foreground the concrete mixer is supplying concrete to be distributed over the floor thru the trough distributer. In the rear a second concrete mixer is in place to supply concrete to hand dump cars on tracks for distribution over the roof forms and in the side and center wall forms.*

OUTLET OF POGUE'S RUN *twin conduits. Side walls, end wall and outfall paving all of reinforced concrete.*



COMPLETED ROOF *of the twin conduits of the Pogue's Run improvement ready for earth covering. This covering will vary from practically nothing under some street crossings to perhaps 20 feet where the fill for the track elevation is carried on the roof.*

THE MUNICIPAL GAS PLANT

OF ST. PETERSBURG, FLORIDA.

But few municipalities in this country own and operate their own gas plants, and the increase in the number of such plants is not rapid. The plant described in this article is apparently up-to-date and should give efficient service for a long time if properly managed and operated.

THE first municipal gas plant in the State of Florida has just been completed at St. Petersburg and was put in operation in the latter part of November. The new project will be watched with interest by city officials and engineers as one more answer to the question of whether a municipal gas plant is advisable. The plant is one that the city may well be proud of and both the city officials and the engineers look for the fulfillment of their hopes for its successful operation.

The completion of the gas plant is the culmination of much agitation and debate on the question of municipal ownership, as more than once the city was on the point of granting a franchise for the construction of a plant by a private individual. The people themselves finally decided not only to retain this right but to endorse the policy of municipal ownership of all public utilities.

The city of St. Petersburg, altho having a permanent population of only 10 to 12 thousand, has a transient winter population of two or three times that number; all coming from homes in the large cities of the North, where they are in the habit of using gas for various purposes; and even the year-round population of the city is largely composed of people who have used gas at some time and are familiar with its convenience and economy. For this reason, St. Petersburg offered a better field for a gas plant than most cities of its size, and the subject had been talked to a greater or less extent for as long as eight or ten years. Many houses which were built ten years ago are piped for gas.

The first definite move taken toward securing a plant was in the latter part of 1911, when the question began to be debated in the city council and a committee was appointed to investigate and report to the council. From that time until March, 1913, the matter was much discussed and bids for franchises were received several times, some of which were favorably considered by the Council. Mayor Pheil maintained that the prices fixed, which ranged from $1.40 to $1.90 per thousand cubic feet, were too high, and advocated a municipal plant. The fight came to a head in March, 1913, when the council had voted to grant the franchise to W. C. McClure, of Peoria, Ill., who offered to sell gas at $1.45, which seemed to be a reasonable price compared to other places in the state. McClure, in order to bind his contract, started construction at once. Shortly after this the city government was changed to commission form, consisting of three commissioners, respectively, Public Works and Utilities, Affairs and Finance, and Public Safety. The Commissioner of Public Works and Utilities, Mr. C. D. Hammond, immediately after going into office, reviewed the franchise and contract and notified Mr. McClure that his franchise was invalid and would not be recognized by the commission. Mr. McClure did not see fit to test the validity of his contract in the courts, and the foundation of his building can still be seen in the outlying part of the city, a relic of private ownership in St. Petersburg.

Realizing the great need of a gas plant to the continued growth of St. Petersburg and feeling that such an enterprise should be owned by the municipality, Commissioner Hammond employed the J. B. McCrary Company, of Atlanta, Ga., to prepare plans, specifications and guaranteed estimates for a municipal gas plant. The engineers' report showed that the plant would be a paying investment to the city and recommended a bond election for $148,000.00, which provided a liberal amount beyond the cost of plant for meters, cut-ins and other necessary expenses incurred in putting the plant in operation, and a reasonable amount for future extensions.

The matter was formally placed before the people of the city, and in March, 1914, they voted the bonds necessary for the installation of the plant.

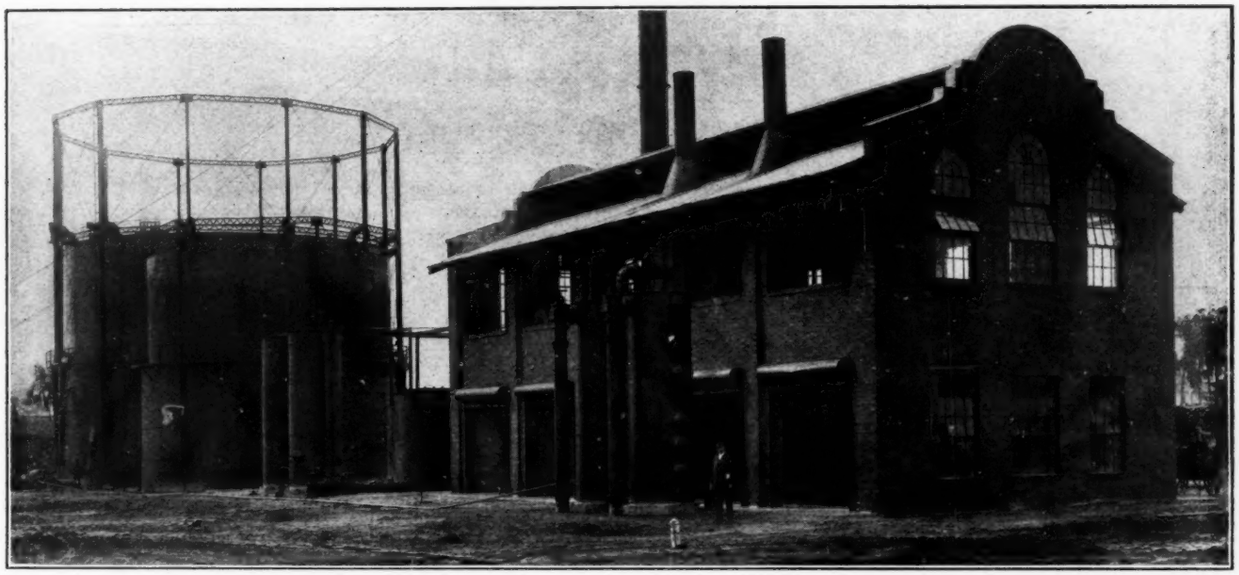
Also in March a letting was held and several bids were received, but it was found that no bid or combination of bids came within the guaranteed estimate submitted by the engineer, and after due consideration the city decided to give the McCrary Company the contract for construction on a percentage basis with their guaranteed estimate as the fixed maximum, as this plan saved the city at the outset several thousand dollars.

The gas-making machinery was furnished and installed by the Gas Engineering Company of Trenton, N. J. The boilers, holders and structural steel for the building were installed by the R. D. Cole Company of Newnan, Ga. The building and the laying of the mains were contracted out by the McCrary Company to the Mutual Company and Frank J. Stamm & Son, respectively, both local concerns of St. Petersburg, Fla., as it was their policy to have as much work done locally as possible. Construction was started the latter part of May and the plant was completed in an unusually short time, barely seven months elapsing from the time ground was broken until gas was turned on the first consumer.

Although there are no strikingly novel or unusual features about the installation, it is in many respects a model plant as to arrangement, etc., as will be seen from the accompanying illustrations. It occupies the entire length of a city block, allowing plenty of room around the plant and eliminating any crowding of the apparatus. The part of the yard around the building and between the building and the purifiers is paved with brick laid flat on the natural sand foundation, which adds greatly to the appearance of the plant and facilitates the handling of fuel and oxide. The rest of the yard is sodded.

The building is of strictly fireproof construction, having a steel frame with brick curtain walls and concrete roof. The end walls have large steel frame windows, six in each end, while each side has five 10-foot openings on the ground floor and five on the operating floor, provided with steel roller shutters and with only 4 feet of brick between them, thus providing a maximum of ventilation for the warm climate of Florida.

The arrangement is such that there is plenty of room for convenient operation with all the machinery located in the same building. About two-thirds of the length of the building is occupied by the water-gas sets and next to them are located the boilers. Beyond the boilers, in the end of the building, are the meter room on one side and all the pumps on the other. By this arrangement the pumps can be attended to by the fireman with the least possible trouble. There are no partition walls in the building except those around the meter room, as they were not necessary with this thoroly fireproof construction and by this design it is possible for the gas maker at all times to watch the fireman and the pumps without leaving the operating floor, since the space in front of the boilers



MUNICIPAL GAS PLANT *at St. Petersburg, Fla., a modern water-gas plant. In this view can be seen all the outside features of the plant mentioned in the article, except one or two of the smaller storage tanks.*

and over the pumps is not floored over. The operating floor, which is of steel plates supported on I-beams, extends as far as the boilers and behind them; this extension, together with a reinforced concrete slab over the meter room, affording ample space for two turbine-driven Sturtevant No. 7 blowers, which are operated by cords from in front of the water-gas sets.

There are two 80-h.p. vertical Manning-type boilers of heavy construction, making a compact boiler plant and doing away with the trouble incident to a brick-lined furnace. The The small floor space occupied by this type permitted the exhauster, a Roots No. 4, to be located on the ground floor behind the boilers.

There are two 5-foot water-gas sets with 6-foot generators, giving a present capacity of 500,000 cubic feet per 24 hours. This apparently large capacity was thought necessary on account of the large winter population, which is constantly growing. Space is provided in the end of the building for the addition of a third and larger set when it is needed. The sets are of standard construction, provided with up and down run connections, with single reversing valve between generator and carburetor. Each set has a separate seal located on the operating floor with seal pot in front for ready inspection.

The take-offs of the seals join before running to the scrubbers, which are located just outside of the building. There are two scrubbers arranged with by-passes so that either one can be cut out or both used in series or in parallel.

The scrubbers deliver the gas to a relief holder of 25,000 feet capacity and from there it is taken by the exhauster and forced thru the rest of the apparatus to the storage holder. Only one exhauster is installed at present, but by-passes are arranged so that the pressure can be maintained by the relief holder in case of breakdown, and space is provided for the installation of a duplicate exhauster when necessary.

After leaving the exhauster the gas passes thru a tar-extractor, water-tube condenser, shaving scrubber, two 12-foot oxide purifiers and an 8-foot station meter to the storage holder. This is a two-lift holder of 150,000 cubic feet capacity. A standard Connelly governor is located directly at the outlet of the holder. Every piece of apparatus is by-passed according to the best practice to insure against interruption of service.

As previously stated, all the pumps are located in one corner of the building. These consist of two oil pumps, two feed pumps and one circulating pump. The oil pumps are connected for filling the oil-storage tank of 25,000-gallon capacity, if desired, but this is so situated that it can also be filled by gravity thru a 2-inch line from the railroad siding built for the plant. The feed pumps take their suction direct from the city mains or thru a Stillwell heater, which is supplied with water passing thru the condenser. They also have a connection to a creek which passes near the plant, so that this soft water may be used in the boilers if desired in case of trouble with scale from the city water. The circulating pump supplies liquor from the tar-separator tank to the overhead storage tank, and thence to the two wash-boxes, thus allowing a minimum to overflow into the creek, which flows thru a residence part of town.

The distributing system consists of a main 12-inch feeder leading from the plant to the central part of town, with 6-inch and 8-inch trunk lines branching off on each side of town and in the center and 4-inch laterals laid in all the alleys. This forms a gridiron covering practically all of the territory in town with very few dead ends. The trunk lines run full size to the city limits to provide for extensions into new territory which is being added very rapidly.

The price of gas has been fixed at $1.25 per thousand. In the engineers' report it was estimated that at this price, with 1,000 consumers, the city would net something over $250.00 per month above operating expenses and interest on investment. This was based on oil at 5 cents per gallon and coke at $6.00 per ton. The city is now using anthracite at $7.65 per ton and oil at 4 cents, so that this estimate should at least be met if the number of consumers is secured in a reasonable time. At present writing it appears that this will be the case, for there were about 100 consumers when gas was turned on, and after the plant had been in operation three weeks there were over 300. Late in February the number of actual consumers had increased to 450. With as good a start as this it will be surprising if the plant does not soon become self-sustaining. Everything points to the success of the undertaking and there is every reason to believe that the city will have reason to be proud of the showing made by the end of the first year.

ROAD AND BOULEVARD CONSTRUCTION

IN PHILADELPHIA, PA.

The City of Philadelphia covers the entire county and has many miles of country road as well as of streets with little traffic, on which forms of road improvement can be used which are less expensive than regular street pavements. The Bureau of Highways has fully recognized that fact, as this article clearly shows. In connection with the regular road construction work some interesting experiments are under way, the progress of which is also reported in this article.

THE CITY OF PHILADELPHIA occupies the entire county of Philadelphia, Pennsylvania, and therefore has a large mileage of country roads to construct and maintain. The city is also developing a boulevard system which is requiring a large amount of attention.

These two classes of roads are similar in some respects and very dissimilar in others. They are both in the charge of the Bureau of Highways and Street Cleaning, of which William H. Connell is the chief, and the following facts and photographs are from the portions of his reports covering these subjects:

In 1914, $684,644.16 was expended for the construction and maintenance of macadam roads, and all the important thorofares of the city have been constructed with improved types of pavement, leaving the streets of local importance yet to be done. The accompanying map shows the work done on roads and boulevards during 1912 to 1914, inclusive, and the condition of the roads not improved during that time.

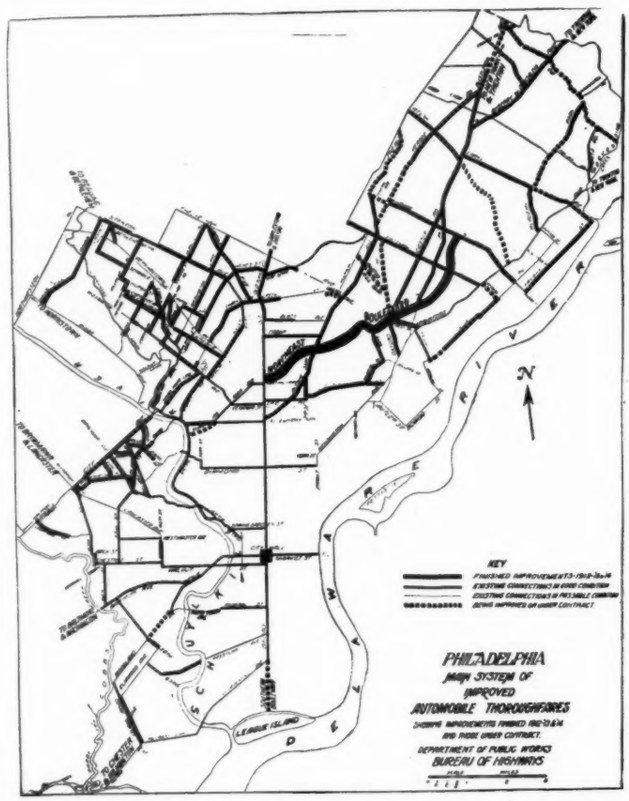
Recognizing that the durability of bituminous pavements is largely dependent upon the stability of the foundation, the greater part of them are placed upon concrete base with thickness of 4 inches when laid upon old macadam foundation, and 5 inches for new road construction. This base has added an average of 10 to 15 cents per square yard to the first cost, but the increased life of the pavement and the cheaper cost of renewals of the bituminous surface, when these renewals become necessary, will far more than offset the slightly increased original outlay.

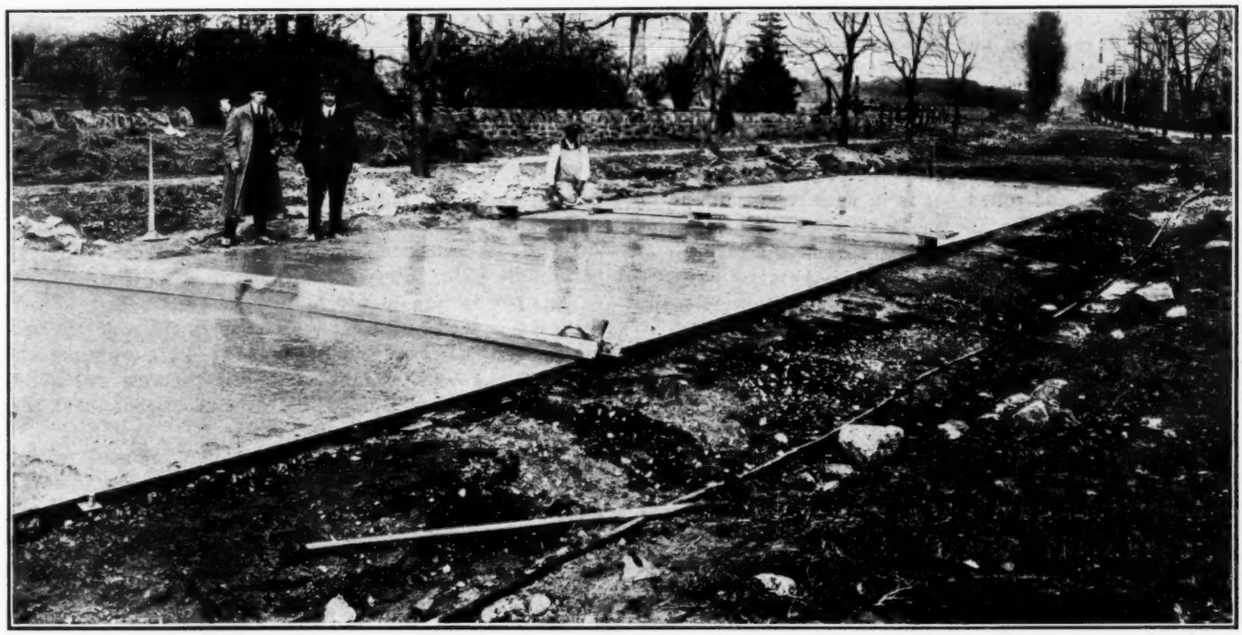
The most important macadam thorofares in poor condition are those occupied by three independent trolley lines. Their franchises provide that they shall maintain the pavements on the entire area of these roads, but traffic conditions have so changed that the railway companies have refused to make the necessary repairs and an attempt to force an issue by serving notice that if immediate repairs were not made the road would be barricaded, as is provided in the franchise, resulted in an injunction against the enforcement of the order and the matter is now pending in court.

During 1914, under 170 grading contracts, 22.22 miles of streets have been graded, which have done much to develop not only the actual streets, but the surrounding territory.

While the surfacing of macadam roads and bituminous and concrete road construction has been performed by contract, it has been so clearly evidenced by the experience of former years that the resurfacing and patching of waterbound macadam roads should be handled by city forces that practically all of this work was during the year performed in this manner. During 1914, 18.2 miles of macadam roads were resurfaced by the city forces at an average unit cost of 39 cents per square yard, which compares most favorably with the unit price of 51 cents per square yard, the average price for contract work under similar conditions. The reason this work can be so much more effectively performed directly by the city forces is that the repairs to be made on any given road cannot be definitely determined in advance and no contractor bidding to do this work can tell before its commencement what quantities of material or how much labor will be required. He is therefore, compelled to bid a rather high price to protect himself, but this condition does not obtain when the work is performed directly by the city forces.

The application of bituminous surface treatments on macadam roads, which practice was introduced in 1912, has been one of the great successes in the work of the bureau and has probably proved of more benefit to the residents living on these roads than any one thing done during this administration, as it has not only eliminated the dust nuisance and the mud in wet weather, but has added very much to the appearance of the streets and makes an ideal road for suburban traffic. These surface treatments are being placed on all the waterbound macadam roads which have been resurfaced or which have been placed in a suitable condition to permit of this kind of treatment. The remaining roads that are badly worn are being treated with an asphaltic oil dust layer until such time as funds are available for resurfacing them and applying the regular bituminous surface treatment. As the amount of bituminous material required each year is progres-





FINISHED SURFACE *of test length of concrete roadway on Oxford Pike, showing method employed in finishing the surface.*

sively less for the first three years, the unit cost of this work has been materially reduced, the average cost of surface treating waterbound macadam roads in 1913 being 7.3 cents per square yard and in 1914 5.8 cents. These surface treated roads are to all intents and purposes as satisfactory for the secondary streets as the roads constructed of bituminous concrete, and their cost is greatly less. During the year 98 miles of roads were given bituminous surface treatments and 100.8 miles were treated with a dust layer.

As the use of concrete roads thruout the country is becoming increasingly extensive, it was considered desirable to construct some roads of this type in order to make a comparison, under local conditions, with other methods of country road construction. Two roads of this type were placed under contract; the Oxford pike service test concrete road in the northeast section, on Oxford pike between the Boulevard and Second street, and Monument avenue, between Belmont avenue and Ford road, in West Philadelphia.

The Oxford pike service test concrete road will have a total length of a little over two miles, and a width of 18 feet, and will consist of five principal sections of 2,250 feet in length, each differing in the composition of the concrete, and each section will be sub-divided into two sections of 1,050 and 1,200 feet each, and the 1,200-foot sections will be again divided into four sections to provide for different types of bituminous wearing surface. These sections will be surface treated with refined coal-gas tar (Tarvia), refined water-gas tar (Ugite), asphalt cut-back and Unionite (a mixture of rock asphalt and stone grit); in addition to which a portion of each section will be left without any surface treatment. Transverse expansion joints will be placed every 30 feet; two types of joints will be used, armored and prepared bituminous.

The composition of the five concrete sections is as follows: First section: 1 part cement, 2 parts sand, 3 parts gravel; second section: 1 part cement, 2 parts sand, 3 parts crushed trap rock; third section: 1 part cement, 1 part trap rock grit, 1 part sand, 3 parts crushed trap rock; fourth section: 1 part cement, 2 parts trap rock grit, 3 parts crushed hard limestone; fifth section: 1 part cement, 2 parts trap rock grit, 3 parts crushed trap rock.

The Monument Avenue road was laid in accordance with the design and methods of construction that were considered best adapted to meet local conditions and which in most particulars conformed to the latest practice, the exception being that stone grit and sand, in equal proportions, were used in the aggregate instead of sand, which has been the usual practice. This road is also 18 feet in width, with transverse armored expansion joints every 30 feet.

Both of these roads are under construction and will be completed early in the spring.

The Byberry and Bensalem Pike service test road, comprising twenty-six different sections, each constructed in accordance with one of the recognized standards for the construction of country roads, was begun in 1912 and completed in September, 1913. A preliminary report detailing the method of construction used in each section and the cost was made last year. As the road is but little over a year old, it is impossible to reach any final conclusions. It is part of a thru route to Trenton and New York, and is being observed with much interest by all the motorists in this section, and it is, of course, being carefully followed up by road engineers thruout the country.

The first section of the road, laid with Amiesite of trap rock and asphaltic cement, is in good condition, a few waves having developed. Repairs for two years, November 18, 1912, to December 31, 1914, have cost $3.00.

The second section, a bituminous pavement, mixing method, Topeka specification, trap rock and Pioneer road asphalt, is in good condition, but commencing to wave slightly, and has cost nothing for repairs.

The third section is of 5-inch concrete pavement with a bituminous top composed of one-half gallon of Pioneer road surface asphalt per square yard and stone chips. The bituminous surface has disintegrated and peeled off the concrete base, which latter has developed a number of longitudinal and transverse cracks. The renewal of the bituminous surface would cost about $64, or 12 cents per square yard for the 533.3 yards area of pavement.

The fourth, eighth, tenth, thirteenth, fifteenth, eighteenth and twenty-sixth sections, of vitrified brick block on 4-inch

concrete base, are in good condition, except a slight longitudinal crack in section 8, and have had no repairs.

The fifth section is 5-inch concrete pavement with bituminous top part laid with 1/6 gallon per square yard of Ugite A applied by hand and ⅜ gallon of Ugite No. 3 applied hot by pressure distributer with ¾-inch thickness of dry trap rock chips, followed by ¼ gallon of hot Ugite No. 3 covered with torpedo sand and rolled. It is in good condition and no repairs have been made. On about 260 feet of this section Tarvia B and A were applied about as above described for Ugite, except the second coat was omitted. About 20 per cent. of the surface has pulled off and is in poor condition. Repairs if made would cost about $9, or 1.9 cents per square yard.

About 230 feet was coated with Texaco applied very nearly as the Ugite was applied except the omission of the second coat. Practically all of the bituminous top has peeled off. Repairs, if made, would cost about $50, or 12 cents per square yard to renew the surface.

The sixth section, of Filbertine, a bituminous pavement, mixing method, of limestone aggregate and asphaltic cement, 2 inches thick, is in good condition, requiring no repairs.

The seventh section is a bituminous pavement, mixing method, of trap rock and asphaltic cement, part of the area having a seal coat of ¼ gallon hot asphaltic cement per square yard and ⅜-inch clean trap rock chips. It is all in good condition, not requiring repairs.

Part of the ninth section is a 5-inch concrete pavement with Dolarway bituminous top, which is generally in good condition, the slight repairs which might be made being estimated to cost $3. Part of the concrete was covered with ⅛ gallon per square yard of Bicomac with trap rock chips and dust and more Bicomac. Half the surface was covered with trap rock dust and half with trap rock chips and rolled lightly. Ninety per cent. of the top has peeled off and the cost of repairs if made would be $13.44, or 11 cents per square yard.

Part of the concrete was covered with 0.4 gallon per square yard of asphalt in naphtha, the naphtha burned out and trap rock chips spread and rolled. Practically all the bituminous surface has peeled off and it would cost $13.80, or 12 cents per square yard, to resurface it.

Another section to which Bicomac and asphalt were both applied has peeled off completely, leaving the concrete base in good condition. This would cost $22.92, or 12 cents per square yard, to resurface. Another section of concrete was left bare and is in good condition, with no repairs except that the surface is slightly pitted in a few places.

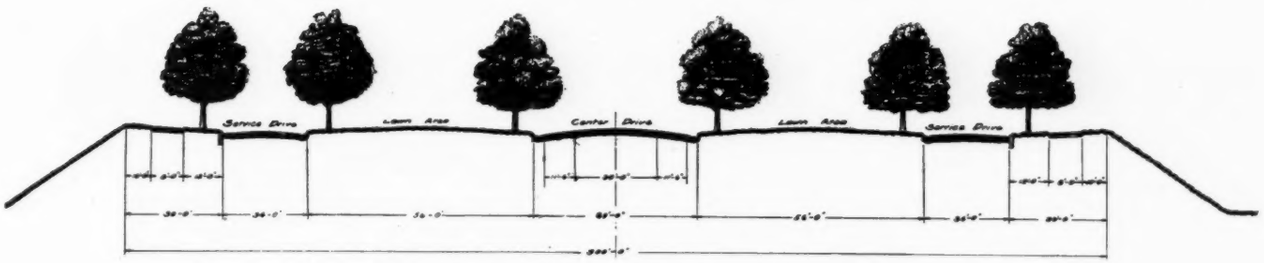
The eleventh section is a variety of bituminous pavement, mixing method with seal coat, which was laid late in 1912 and required $25 worth of repairs in 1913, or 2.3 cents per square yard of the pavement, probably due to the weather conditions during construction, as the pavement is now in good condition except a few small holes that require patching.

The twelfth section is also a variety of binuminous pavement, mixing method, with gravel and asphaltic cement, part having a seal coat of asphaltic cement and trap rock chips and part covered with sand. It is in good condition without repairs except that the surface is slightly wavy.

The fourteenth section is of 5-inch Hassam concrete pavement with bituminous top, 2½-inch trap rock, 1½-inch trap, and crushed pebbles being used in the three parts, and hot Ugite No. 3 in the surfacing. It is in good condition, with no repairs.

The sixteenth, seventeenth, nineteenth, twentieth, twenty-first, twenty-second, twenty-third and twenty-fourth sections are bituminous pavements, penetration method, trap rock

THE LAST SECTION *of the Byberry-Bensalem test road, on which many kinds of bituminous surfaces are under test, with sections of brick roadway between. This last section, No. 26, is of brick. Bucks County is seen in the background.*



TYPICAL CROSS-SECTION
OF THE FINISHED SURFACE OF
THE NORTHEAST BOULEVARD

aggregate, binder applied hot, and having seal coat. Section 16 has Ugite binder and is in fair condition but raveling in spots. Repairs from October 1, 1913, to December 31, 1914, cost $9.67, or 1 cent per square yard, and another dollar will put it in good condition.

Section 17 has Byerlyte asphalt binder. It raveled so badly that it was rebuilt in 1914 with Tarvia X, costing $473.82, or 74 cents per square yard. It is now in good condition, tho more or less open.

Section 19 has Tarvia X binder applied with pressure distributer. The pavement was laid in July, 1913, and rebuilt in November, 1913, the original material having been burnt in preparing for laying. It is now in good condition, tho more or less open.

Section 20 has Texaco asphalt binder. The repairs from October 1, 1913, to December 31, 1914, cost $4.36, or ½ cent a square yard. It is now in fair condition, tho slightly rough and breaking in a number of places, repair of which would cost $7.50

Section 21 has Standard binder B. It is in good condition, without repairs, except for a slight rut about 50 feet long.

Section 22 has Pioneer road asphalt binder. It is in fair condition, without repairs, showing only slight wear on the seal coat.

Section 23 has Bermudez asphalt binder and is in good condition, without repair, showing only slight wear on the seal coat.

Section 24 has Sun Hydrolene asphalt binder. It is in good condition, without repairs, showing only slight wear on the seal coat.

The twenty-fifth section is Bicomac concrete pavement with 4-inch concrete covered before setting with cold bituminous top of portland cement, sand, trap rock and Bicomac and water. It is in fair condition, with a few transverse cracks and a surface roughening under traffic. Repairs from January 19, 1913, to December 31, 1914, cost $127.95, or 11½ cents per square yard, the repairs probably being required because a part of the pavement was laid in freezing weather.

Of all the noteworthy accomplishments of the bureau during 1914, the one that is probably of greatest importance to the city, and of greatest value to the users of the highways, has been the opening of the Northeast boulevard, from Broad street to Rhawn street. This not only has provided a magnificent thorofare tending to increase property values and encourage building in its immediate vicinity, but it will also have a far-reaching influence on the development of the northeastern portion of the city, which heretofore has been handicapped thru the inadequacy of its main arteries of travel.

The opening of the boulevard to Rhawn street now provides a continuous improved road from City Hall, over Broad street to the Northeast boulevard, thence to Rhawn street, Bustleton pike, over the service test road to the county line, and thence to Trenton and New York. The completed boulevard is 6.58 miles long and 300 feet wide, having a central driveway 60 feet in width, two side driveways each 34 feet in width; the remaining space being used for footways, planting and lawn areas.

The $1,000,000 contract executed in 1913 for the completion of the boulevard from Second street to Rhawn street, consist-

METHOD OF CONSTRUCTION *of center driveway on Northeast Boulevard; concrete with paint coat and six-inch concrete curbs separating the waterbound macadam shoulders from the bituminous strip in the center of the roadway.*

COMPLETED SECTION OF NORTHEAST BOULEVARD, *showing the three driveways, grass plats, and sidewalks, an ideal method of separation of speed classes of travel.*

ing of all grading, sidewalks, drainage, planting and the paving of the central driveway for the entire length and the side driveways from Second street to Tacony Creek bridge, is practically completed. In addition another contract in the amount of $385,000 has ben executed for reconstructing the central and side driveways from Broad street to Second street, and paving the side driveways, together with the necessary incidental work, between Second street and Rhawn street. Work on this contract was begun in September of 1914 and its progress has been so rapid that the entire paving has been completed between Broad street and Second street. The total cost of construction of the boulevard from Broad street to Rhawn street is $2,807,790.96, which includes the four contracts and six supplemental contracts awarded since April, 1903.

Plans are now being prepared for the extension of the boulevard from Rhawn street northward, for which $400,000 has been appropriated, and work will be put under contract in the spring of 1915.

The Southern boulevard develops South Broad street from Oregon avenue to the Navy Yard at League Island. From Oregon avenue to Bigler street the boulevard is 70 feet in width, this portion running thru and being part of the Plaza, which forms an entrance park to the boulevard proper. From Bigler street to Pattison avenue the boulevard is 300 feet wide, consisting of a 50-foot central driveway, two 26-foot side driveways, and six different lines of footways, four 8 feet in width and two 10 feet wide, the remaining 146 feet being utilized for planting and lawn areas. From Pattison avenue southward the boulevard lies within the boundaries of League Island Park and in this portion its width is 143 feet, made up of a central 50-foot driveway, on either side of which is a footway 18 feet in width. On the extreme easterly side is a space 21 feet wide in which the trolley tracks are temporarily located. The remainder of the space consists of planting areas.

Owing to the projected work of eliminating grade crossings in South Philadelphia, it was impossible to arrange for physical construction between Pollock and Packer streets, where the boulevard will pass over the tracks of the Belt Line Railway. Plans for the improvement of this portion of the boulevard are now being prepared and the work will be placed under contract as soon as funds become available for the purpose. The present $210,000 contract for the completion of the boulevard from Oregon avenue to a point 1,650 feet south of Pattison avenue, due to many unfortunate delays, has not been completed this year, as was anticipated. About 90 per cent. of the work under this contract, however, has been finished, and the remainder will be entirely completed early in the spring of 1915.

In 1912, at the beginning of the present administration, the specifications in use in the bureau for all classes of road construction did not conform to the requirements of modern practice. The details of practice in highway work are by no means finally standardized on account of the continued improvements in construction which are devised from year to year, and hence the specifications must continually be altered in many details. In September of 1914 the bureau issued a new set of standard specifications covering all the classes of improved pavements which are now being laid in Philadelphia and in the compilation of these specifications has performed a service of great value to the city, and has developed a specifi-

A TYPICAL COUNTRY ROAD *pavement, with a bituminous strip in the center and water-bound macadam shoulders.*

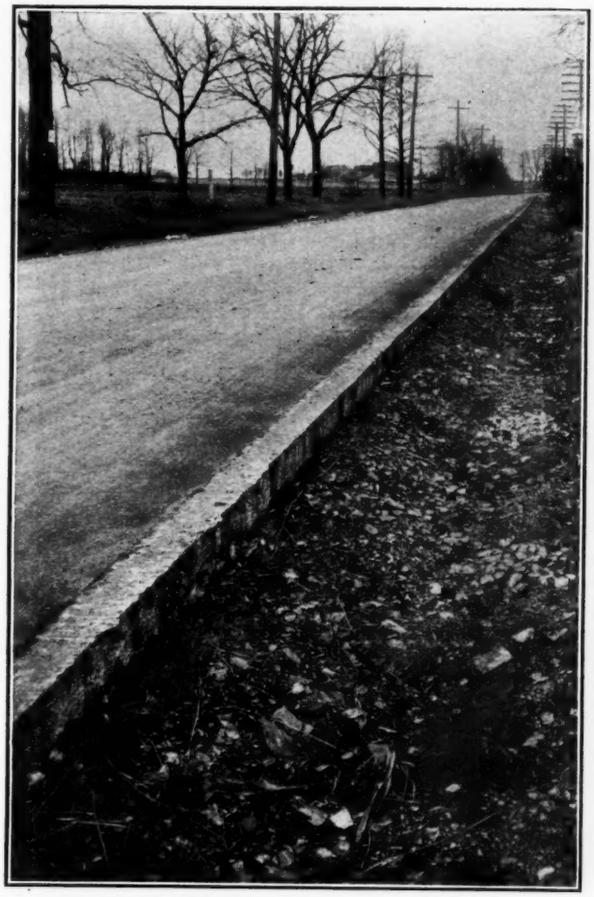
cation that is in much better form than that used by most of the larger cities.

This single-standard specification covering all classes of the so-called improved types of city pavements, and combining the material covered by twelve former specifications, not only effects an economy, but makes the requirements more readily available for reference. Great care has been exercised in the phrasing and arrangement of the general clauses and the inaccuracies and inconsistencies that crept into the former specifications have been eliminated.

A similar standard specification comprising all the different varieties of work performed on country roads has also been compiled and will be published and put into effect during the coming year. The final drafting of these specifications is undoubtedly one of the most important accomplishments, for the nature of all construction work is primarily dependent upon the specifications and no matter how effective the organization may be, it is impossible for it to accomplish the proper results unless the specifications under which the work is performed conform to the best standards.

While a complete system of inspecting and testing materials independently of the field inspection was inaugurated last year, it has been only during 1914 that this work has been systematized. Inspectors have been stationed in each of the eight bituminous paving plants in the city and are given definite instructions relative to the preparation of the materials required for each specific street. Heretofore, bituminous materials have been prepared according to a single standard without varying the proportions of the materials to conform to the specific requirements of the individual location where it is to be used, but under the present system it is possible to make a definite study of the traffic conditions and to predetermine and obtain a definite material which will best serve in that particular location. This feature of the work is a distinct advance over the former practices employed in this city and permits of an exact control of the construction which is enjoyed by few cities.

The inspectors stationed at the bituminous plants, in addition to controlling and regulating the materials used, make periodical tests of the ingredients, check the proportions and methods of combination, regulate the temperatures, and submit samples to the laboratories for analysis both of the ingredients and the final mixture. The analyses of the materials are made a portion of the street record and will in the future furnish an invaluable aid to the proper design of bituminous pavements. Had such data been available in regard to work performed in the past, the work of the bureau would have been much simplified and the proper results could have been obtained in a much shorter time. All other materials used in highway construction are thoroly inspected and tested and no material is allowed to enter any work until it has been examined and found to conform to the specification requirements.



TYPICAL COUNTRY ROAD CONSTRUCTION *in the city of Philadelphia. A bituminous pavement with concrete curb; shoulders to be filled in later.*

An illustration of the effect of this careful inspection of materials is given by the withdrawal from the local market of a number of brands of vitrified block which were used extensively prior to 1912, but which could not meet the present requirements for wearing qualities. The elimination of unsuitable material has continued even thru the past year, with the result that only blocks of assured quality are now being shipped for use upon city contracts, and at the same time additional brands of superior blocks are being introduced to re-

THIS TABLE SHOWS THE DETAILS *of the costs of bituminous surface treatment done during* 1914, 1,034,470 *square yards of roadway having been treated with a total of* 334,377 *gallons of the materials named.*

	AVERAGE PER SQ. YD.		AVERAGE LABOR COST PER SQ. YD.					AVERAGE MAT. COST PER SQ. YD.			AV. TOTAL COST PER SQ. YD.	AVERAGE TOTAL COST PER SQ. YARD 1st & 2nd TREAT.	
	GAL. BIT. MAT.	LBS. COV'G MAT.	SWEEPING HAND	SWEEPING MACH.	CHIPS.	CLEAN. UP	TOTAL LABOR	BIT. MAT	COV'G MAT.	TOTAL MAT		1914	1913
REFINED COAL TAR-HEAVY-(Tarvia A) 1st Treatment	.464	16.2	.0051	.0017	.0046	.0026	.0140	.0373	.0175	.0548	.0688	.0641	.0824
REFINED COAL TAR-HEAVY-(Tarvia A) Retreatment	.291	15.6	.0039	.0009	.0112	.0024	.0182	.0244	.0167	.0411	.0593		
REFINED COAL TAR-LIGHT-(Tarvia B) 1st Treatment	.389	15.7	.0069	.0024	.0067	.0047	.0207	.0258	.0168	.0426	.0633	.0566	.0658
REFINED COAL TAR-LIGHT-(Tarvia B) Retreatment	.314	14.6	.0044	.0011	.0055	.0034	.0144	.0200	.0155	.0355	.0499		
REFINED WATER GAS TAR-LIGHT-(Ugite) 1st Treatment	.299	16.3	.0030	.0004	.0039	.0026	.0099	.0248	.0171	.0419	.0518	.0509	.0698
REFINED WATER GAS TAR-LIGHT-(Ugite) Retreatment	.301	13.4	.0034	.0006	.0067	.0003	.0110	.0239	.0149	.0388	.0500		
ASPHALT CUTBACK 1st Treatment	.346	17.5	.0057	.0021	.0061	.0042	.0181	.0420	.0188	.0618	.0799	.0738	.0868
ASPHALT CUTBACK Retreatment	.287	18.5	.0026	.0014	.0057	.0039	.0136	.0309	.0223	.0532	.0677		

UNIT COSTS FOR REPAIRS MADE BY CITY FORCES

1914.

RESURFACING WATERBOUND MACADAM

DISTRICT	SQ.YDS.	LABOR	TEAMS	MATERIAL	TOTAL	AVERAGE UNIT COST
1	9021	1620.66	1121.00	2805.90	5547.56	.615
2	700	130.32	15.75	131.25	277.32	.396
3	----	-------	-------	-------	-------	----
4	----	-------	-------	-------	-------	----
5	10075	1136.64	1682.00	2299.73	5118.37	.508
6	32702	3361.24	674.03	6781.43	10816.70	.331
7	55951	3994.05	3704.75	11743.11	19441.91	.348
TOTAL	108449	10242.91	7197.53	23761.42	41201.86	.38
7	3378	123.21	105.25	106.99	335.45	.10

spiked up and rolled, very little material used.

PATCHING WATERBOUND MACADAM

1	9609	2113.45	1511.36	1445.15	5069.96	.528
2	----	-------	-------	-------	-------	----
3	----	-------	-------	-------	-------	----
4	----	-------	-------	-------	-------	----
5	4477	824.74	679.58	575.12	2079.44	.464
6	14357	1701.42	599.89	1419.09	3720.40	.259
7	9449	1095.71	1117.67	1428.66	3642.04	.385
TOTAL	37892	5735.32	3908.50	4868.02	14511.84	.383

GENERAL PATCHING WATERBOUND MACADAM

(Done previous to Symbol Code)

6	17515	720.52	233.39	1162.02	2115.93	.121

place the inferior grades that can no longer be used. As an indication of the quality and improvement of block tested by the city, of all the material received for use during 1913 there was rejected 7.2 per cent., while in 1914, under the same specifications and system of testing, the rejection amounted to only 2.7 per cent.

The rigid examination of all materials has greatly enhanced the value to the city of the pavements laid during this administration, and the much longer life of the present construction, together with the lower maintenance costs, will ultimately prove a great economy to the municipality and will demonstrate the advantage of scientific engineering control over the operations of the Highway Bureau.

The total mileage of pavements constructed during the year 1914 was as follows:

	Miles.
Asphalt	21.15
Granite block	1.01
Vitrified block	6.53
Wood block	1.78
Bituminous pavements	15.08
Waterbound macadam	30.56
Concrete roads	1.12
Making a grand total of	77.23

The length of streets graded during the year was 22.22 miles. This brings the total mileage of streets and roads in the city to 1,612.77, which consists of 1,089.43 miles of improved streets, 75.48 miles of bituminous macadam, 242.15 miles of waterbound macadam, 1.12 miles of concrete roads and 204.59 miles of dirt roads and graded streets.

Country roads in the city of Philadelphia, December 13, 1914:

	Miles.	Sq. Yds.
Concrete roads	1.12	28,150
Bituminous pavements	75.48	984,813
Waterbound macadam roads	242.15	2,822,254
Totals	318.75	3,835,217
Earth roads	204.59 miles	

Commission Government and an Engineer Manager

FOR LAKELAND, FLORIDA

By H. D. MENDENHALL, Consulting Engineer.

This article gives the steps by which the people of Lakeland, Florida, finally succeeded in securing a commission form of government for themselves. Apparently, the special form adopted was formulated on the spur of the moment, and the product shows it. In a small city where every one knows every one else, as loosely drawn a charter as this one may be sufficient, because, after all, it is the officials elected and not the form of government upon whom we depend for the results. But in a larger city a much more carefully drawn instrument, from a legal point of view, would be necessary to keep the professional taxeaters away from the banquet which this charter would allow them to set for themselves.

ANOTHER engineer-manager was added to the roll of such officials in commission-governed cities of this country when, on May 1, 1914, Donald L. McLeod, Assoc. M. Am. Soc. C. E., assumed the duties of city manager for the city of Lakeland, Fla., under its new commission form of government. This put the finishing touches to a commission form of administration that is different from the usual in several ways, due to its having to be adjusted to unusual conditions, and yet a form that in spirit and actual operation conforms strictly to the accepted ideas of such government. Furthermore, the form of call and code voted on are distinctive in that they effect the complete transfer of authority from the old aldermanic system to the new and outline a complete method of procedure in the most condensed form that has yet been used.

As engineers are taking an active hand in the establishment of this form of government, and engineers are usually selected to fill the managing positions, a brief story of the steps taken to procure this form in Lakeland may be of interest in assisting some other engineers to get similar forms established in other cities.

In the revised and amended charter of Lakeland as granted by the state legislature of 1911, there was inserted a clause which read as follows:

"Sec. 70. The city of Lakeland is hereby authorized at any future time to establish a commision form of government and to elect its commisioners by popular vote as it may determine. Such commission form of government shall be established in the following manner, to-wit: Upon two-thirds vote of the city council to adopt such commission form of government, the city council shall make a code of laws governing the city which may be enforced by three commissioners. The said code shall be published for a period of thirty days in a newspaper published in the city. An election shall be called by the mayor and the city council for the purpose of submitting the question of ratification of such commission form of government to the voters of the city, which election shall be held not less than thirty days from the adoption by the city council.

"If the majority of the qualified electors voting at the said election shall vote in favor of the said commission, the same shall become operative and in full force and effect as a method of city government. The code of laws so adopted and published shall thereupon become operative and be a portion of this act."

In 1913, a petition signed by several hundred citizens was presented to the city council requesting them to call an election for a form of commission government as authorized by this amendment. At about the same time a mass meeting under the auspices of the Board of Trade was held at which it was decided that the people preferred a form having five commissioners and a manager, the commisioners to serve at a nominal salary, and they to elect a manager who was to receive a sufficient salary to attract an efficient man. Accordingly the council was memorialized to that effect and requested to have the charter amended to permit the change.

As is frequently the case, a majority of the city administration was opposed to the change, and so action on the petition was deferred from time to time until another memorial from the Board of Trade suddenly awakened them to the realization that if the will of the majority of the people was to be considered, very rapid action would be necessary to get the amendment before the state legislature, which was then in session. Accordingly a hasty resolution was passed incorporating the changes desired, submitted to the city attorney, who, incidentally, was opposed to the scheme, and he instructed to get it in shape and forward it to the county representatives in the legislature, with a request for them to get it passed.

The form of resolution submitted to the legislature by the city attorney will never be known, as no copies could ever be found, but the amendment finally passed and made a law read in part as follows:

"The city of Lakeland is hereby authorized at any future time to establish a commission form of government; to elect five (5) commissioners by popular vote, one to be elected from each ward of the city of Lakeland, and one at large, to serve for two years each from the date of their qualification, or until their successors are elected and qualified. * * * *

"The provision of such commission form of government shall include the powers commonly known as the initiative, the referendum and the recall, same to be submitted to the voters for their aceptance or rejection.

"If a majority of the qualified electors voting at said election shall vote in favor of the commission form of government the same shall become effective and of full force and effect as the method of government of the said city.

"In the event said commission form of government should be ratified, the commissioners so chosen shall have the right to employ a municipal manager to have complete control of the business interests of the said city as a business manager, subject always to the direction, supervision and control of the said commissioners, at a salary fixed by the commissioners and subject to be removed by them at their pleasure, with or without cause."

As there are no rigidly defined lines for a "Commission Form of Government," this was considered too indefinite by its opponents to be constitutional. However, its advocates insisted upon the city fathers framing a code and calling an election. This was done hastily, as the date for calling the regular elections under the old form was drawing near. The code and call here given were evolved by one member of the city council and his attorney between the hour of adjournment one night and 10 o'clock the next morning.

Notice of Election.

"Whereas, a petition signed by a number of the qualified electors of the city of Lakeland has been presented to the city council of said city asking for the calling of an election for the purpose of submitting to the qualified voters of the said

city of Lakeland the question of establishing a commission form of government for the city of Lakeland; and, whereas, the city council of the city of Lakeland did, by a two-thirds vote, pass favorably upon the petition, now, therefore, in pursuance of the power vested in me as mayor under the charter and ordinances of the said city,

"Be it known, that an election will be held in the city of Lakeland, on the eighth day of October, A. D. 1913, for the acceptance or rejecting of a commission form of government, and for the election of five commissioners, one to be elected from each ward, and one from at-large, the commissioner from at-large to be known as mayor; said election to be held in accordance with the revised ordinances of the city of Lakeland."

"O. M. EATON,
"Mayor of the City of Lakeland."

"A resolution to establish a form of commission government. Approved September 6, 1913:

"Be it resolved by the council of the city of Lakeland, Fla., that in manner and purport hereof a form of commission government is adopted:

"Section I. Status of Corporate Powers.—The adoption of this form of commission government shall in no sense be construed to increase or diminish the powers vested in the municipal corporation in Polk County known as the City of Lakeland.

"Section II. Transposition of Powers.—All governmental, legislative, executive and judicial powers of the said city are vested in the said commission, subject to such limitations as officials or functionaries labored under prior to the adoption of this form.

"Section III. Powers of the Commission.—Powers, duties or capacities, the exercise, performance or fulfillment of which, respectively, as designated under the laws or ordinances as they now obtain for a named official or functionary, shall be exercised, performed or fulfilled under this commission form in manner and form hereinafter directed, and such acts or ordinances shall be of effect as tho the official or functionary still obtained, except that the persons directed or provided for shall fill the capacity or function.

"Section IV. Differentiation of Powers.—Powers of government heretofore vested in the variously named city officials or functionaries shall be in the commisisoners, in scope following: There shall be five commissioners, one from each of the four wards of the city and one at-large. The commissioner-at-large shall be known as "mayor," shall preside at meetings of the commissioners, and shall vote on all questions, but shall not have the right of veto. The commissioners shall, at their first meeting, elect a vice-president or mayor pro tempore. The commisisoners shall exercise the general governmental powers in them vested, in manner deemed wise, having ever the power to determine upon and employ a municipal manager, to create such departments upon their election as are deemed expedient, to determine upon and employ persons for various duties and functions of the said municipality. Provided ever, that persons not elected by the people shall be removable arbitrarily.

"Section V. Elections Generally.—Qualifications of Commissioners.—Commissioners shall qualify as councilmen do under the present form of government.

"Time, Call and Manner of Holding.—Election shall be held at such times as are required by the laws and ordinances enacted or ordained, or to be enacted or ordained; shall be called by the commission, except in cases provided otherwise, when occasion exists, shall be held in manner provided or to be provided, by the Board of Commissioners.

"Section VI. Initiative, Referendum and Recall.—Initiation or reference of laws or ordinances shall be preceded by a petition signed by twenty-five (25) per centum in number of the electors who voted at the preceding election for commissioner-at-large, and shall be determined by a majority vote of the electors; thereafter law or nullity, respectively. Commissioners shall be subject to recall upon affirmative majority vote of the qualified electors, preceded by petition to the Governor of the State of Florida, signed by twenty-five (25) per centum in number of those who voted in the preceding election for commissioner-at-large. Upon receipt of such petition the Governor shall call such election within thirty days. Upon recall the term expired shall be filled in the manner provided generally for elections. The first twenty-five signers of petitions of initiation, referendum or recall, shall give under oath, their residence and vocation.

"Section VII. All Laws and Ordinances of the City, not Inconsistent, Retained.—Laws or ordinances not inconsistent with the form of commission government herein adopted, remain in force and effect.

"Section VIII. Term, Qualification and Compensation of Commissioners.—The commissioners shall be elected for two years, shall be qualified voters of the city of Lakeland, and shall receive compensation in the sum of one hundred dollars ($100.00) per annum.

"Section IX. Time of Inception.—This form of government shall be in force and effect on January 1, 1914, upon acceptance by the people."

Upon the appointment of a municipal manager, this ordinance was ordained by the Board of Commissioners of the city of Lakeland.

As it stands it is a monument of conciseness, and, despite the strenuous efforts of opposing legal talent to discountenance it, it has stood the test of both the lower courts and the supreme court of the state, and is the basis on which a complete system is being evolved.

It will be noted that the handicap of a legislative requirement that a commissioner be elected from each ward of the city has been cleverly denatured by the provision for recalling by a vote of the citizens of the entire city, thus preserving the true commission spirit and yet conforming to the legislative conditions, and it has not been demonstrated that the form as it now stands is not an improvement over the idea of electing all of the commisisoners from the city at large, since under this form every part of the city is insured a representative.

On October 8, 1913, by a comfortable majority, the voters of the city decided in favor of adopting the form as outlined. Immediately the opposition raised the question of the constitutionality of the act, the good old standby of opponents of any progressive measure. In order to establish its status, it was decided that the newly elected commissioners request the circuit judge to enjoin the mayor and old council from holding the regular fall elections the following month. The judge's decision in this case would be one step towards establishing whether or not the legislative authority would hold. The injunction was granted and the judge's decision in refusing to dissolve the injunction stands as a masterpiece of common-sense logical argument based on the fact that it was the obvious intention of the legislature to grant the powers desired to the city, and the obvious desire of a majority of the voters of the city to adopt the form outlined, and therefore a possible ambiguity in wording should be interpreted in favor of the desires of the majority of the people interested.

This decision still did not satisfy the opponents, and the matter was taken to the supreme court. Here so much time was consumed that January 1st rolled around before anything was definitely settled. This gave the opponents a chance, and so the old council, on which the majority were opponents, and who would automatically succeed themselves were no election held, enjoined the new commisisoners from taking their seat until such time as the supreme court made a decision. Chaos reigned as a result, for each body insisted that the other was illegal.

Fortunately, neither side attempted to make appointments, so the machinery of the city continued under the old employes, and, as the mayor under the old form was elected mayor under the new form, his signature on checks continued legal. Finally, after about two weeks of this condition, the supreme court rendered a decision sustaining the commission form, the old council stepped down, and the administration has been running smoothly and efficiently ever since. After several months of readjusting, the time was considered ripe for the appointment of a manager, with the results already mentioned. Soon after the manager was appointed the following ordinance outlining his powers and duties was passed, and contains the instructions under which he is working:

"Ordinance creating the Office of City Manager and Defining the Duties, Powers and Character of the Office. Approved May 7, 1914.

"*Be it ordained by the Board of Commissioners of the City of Lakeland, Florida*: Section I. That the office of city manager is hereby created, to have such emolument incident thereto as the Board of Commissioners may determine in any particular instance.

"Section II. The incumbent of the said office shall be selected by the Board of Commissioners from available applicants, and he shall hold office during such period as the Board of Commissioners may then or thereafter designate.

Section III. The said officer shall be vested with the powers and charged with the duties in the city of Lakeland, Fla., hereinafter defined: (a) To occupy an office in the City Hall. (b) To require the enforcement of the laws and ordinances. (c) To exercise control of all the officers and employes of the city, and to prescribe and direct their activity. (d) To employ and dismiss officers and employes of the city, provided that before employing or dismissing any department head, the manager shall receive a favorable opinion on his contemplated action from at least three of the commissioners. (e) To superintend works of construction in all respects over which the city may have jurisdiction. (f) To attend the meetings of the Board of Commissioners. (g) To advise the Board of Commissioners, at regular metings of the financial condition of the city. To make at appropriate times reports of any phase of city activity. To suggest needs and means of city betterment. (h) To perform such other duties as the Board of Commissioners may require by resolution or by ordinance. (i) To approve or disapprove the requisition of any officer or employe of the city, prior to the purchase or other transaction in respect to the requisitioned article.

"Section IV. That the said city manager shall not be deemed vested with control of the judge or the city attorney, provided, however, that if the said named officers are not in harmony with the policy of the city manager it shall be his duty to so report to the Board of Commissioners.

"Section V. That the said city manager shall act subject to the approval of the Board of Commissioners in the instances stated: (a) Courses of acts that tend to form the policy of the city in respect to any institution. (b) Purchases of a current nature requiring an expenditure of more than five hundred dollars ($500.00)."

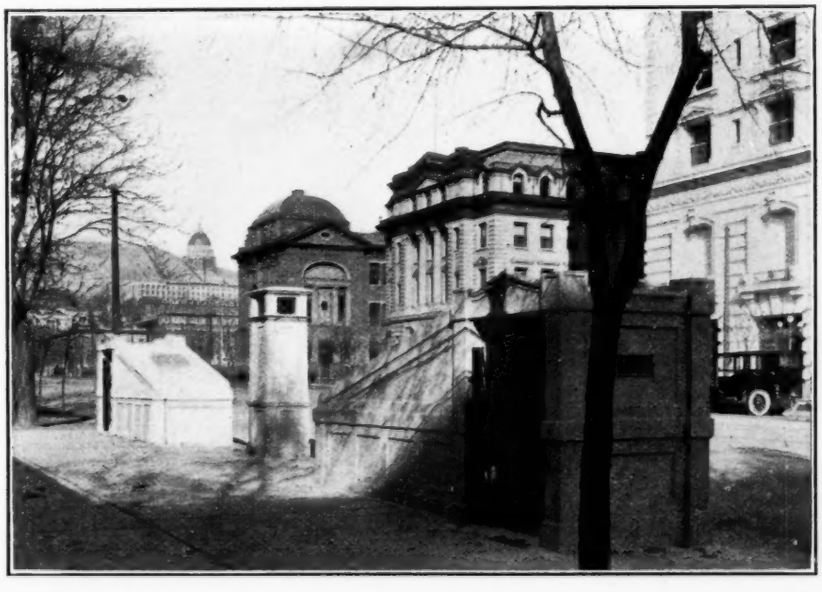
At the present writing the system is working entirely satisfactorily.

PUBLIC COMFORT STATION IN SALT LAKE CITY

The public comfort station erected by the city engineering department of Salt Lake City, Utah, near the intersection of South Temple and Main streets, is designed to accommodate 100 persons per hour. The inside dimensions of the men's station are 17 by 21 feet, of the women's section 17 by 23 feet. It is built of reinforced concrete and placed below the wide sidewalk, with sheltered entrances located next to the curb line of the street. Its cost is about $13,000. It is equipped with the most modern sanitary fixtures, lavatories with hot and cold water and drinking fountains of the latest design. It is heated with steam and electrically lighted, besides the sidewalk lights placed in the ceiling.

The floors are set in white, vitreous hexagon tile. The walls are finished in glazed tile to the top of the stalls and the rest rooms. The upper portion of the walls and the ceilings are finished in Keene's cement, painted with white oil paint and coated with enamel. All partitions are white Alaska marble with nickel-plated top railing. The women's section contains an additional room for babies' attendance. The doors are finished in dark mahogany. Ventilation is effected by motor driven fan, changing air every 3 minutes.

Sylvester Q. Cannon is the efficient city engineer, under whose direction many excellent improvements are under construction.



Municipal Improvements for 1915.

What the Cities and Counties of the United States expect to construct during 1915.

By April 1 of each year a very fair idea of the amount of public improvements to be done during the construction season can be formed, and this annual construction number of MUNICIPAL ENGINEERING is published a few days late that the latest information up to the date named may be included.

The tables are devoted mainly to the cities of more than 10,000 population, a very large proportion of which have responded to the requests for information. Our thanks are due to the Mayors and City Engineers in particular and to many other officials for their courtesies in making the estimates and returns.

Some information from cities of less than 10,000 population has been obtained from city officials and from other sources, and it is included in the tables also.

All the information is fresh, all of it having been received in this office since February 10.

The data concerning pavements in cities and county roads have been tabulated as that seems to be the method of presentation most desired by the reader. The information concerning other improvements has been arranged in paragraphs. In all cases the arrangement is first alphabetical by states, then alphabetically by post offices in the states. In the tables of county work the arrangement is alphabetical by county seats under each state, the name of the county being given with the county seat.

STREET PAVEMENTS—1915

City	Asphalt	Asphalt Concrete	Asphalt Macadam	Bitulithic	Bituminous Concrete	Bituminous Macadam	Brick	Cement Concrete	Granite	Gravel	Macadam	Oiled Macadam	Sandstone	Wood Block	Others
Alabama—															
Anniston											$4,600 sev'r'l m				
Bessemer	None														
Florence	None														
Arizona—															
Flagstaff								12b							
Arkansas—															
Fort Smith											3.5m				
Hot Springs												23.715y		2.715y	
Pine Bluff					150,000y		16,000y								
California—															
Alhambra	2m											3m			
Long Beach	5.5m	1m										1m			
Los Angeles															50ma
Pasadena				9,795l				28691			66,039l				$1,600a
Pomona	9.5m														
Porterville	472,750y		33b												
S. Bernardino															6,000ln
San Francisco	300,000y					230,000y	10,000y				30,000y				158,000y
San Jose	4m	6m													
Santa Barbara	60,000y														
Santa Rosa	26,288y										9,000y				
Colorado—															
Boulder	not yet determined.														
Canon City	None														
Denver	25,000y						$14,000	20,000y			10,000y				1pa
Trinidad	Not yet determined.														
Connecticut—															
Branford								6m							
Bristol									0.33m						
Danbury							$35,000								
Danielson	not yet determined.														
Meriden							2,570y							9,240y	
New Haven															$115,000a
Rockville	None														
Torrington			0.5m			0.5m				1m		5.8m			
Waterbury								$5,000	6,200y		$20,000				
Delaware—															
Wilmington	Nothing definite as yet.														
Florida—															
Jacksonville						388y									
Key West							0.75m								
Miami		100,000y	372,000y												
Pensacola															6,000ya
St. Augustine															$27,000a
Tallahassee							2m								
Georgia—															
Americus	None														
Atlanta															$700,000as
Cordele	None														
La Grange							40,000y	20,000y							
Rome											12,000y				20,000yg
Valdosta	None														
Waycross							11,000y								

City	Asphalt	Asphalt Concrete	Asphalt Macadam	Bitulithic	Bituminous Concrete	Bituminous Macadam	Brick	Cement Concrete	Granite	Gravel	Macadam	Oiled Macadam	Sandstone	Wood Block	Others
Illinois—															
Alton							5.5m								
Aurora	16,000y						2,100y								
Berwyn							11,050y								
Bloomington							$8,000.00								
Blue Island							79,931y								
Cairo							1,500y			40,000yd	40,000yd				
Charleston	Not yet determined.														
Chicago Hghts.		20,260y					28,354y								
Cicero		25,300y					7,900y				22,900y				
Clinton							20,000y								
Decatur														55,000y	
Duquoin	Not yet determined.														
Elgin		10,000y					12,000y								
El Paso							17b								
Galesburg							$23,881								
Joliet					20,000y		25,000y				6,200y				
Kankakee		$53,860													
Litchfield							10b				1mi				
Minonk							2m								
Moline							36,546yd	36546yd							
Oak Park	2,659y	131,360y					16,456y								
Pana	No estimate yet.														
Peoria								$6,000.00							
Quincy	Not yet determined.														
Rushville							8,000y				4,000y				
Spring Valley							3,700l								
Sterling	Not yet determined.														
Taylorville	None														
Waukegan		2,050y					8,000y					21,000y			
Indiana—															
Anderson								3m							
Angola							8,400y								
Brazil							1,300l								
Clinton	None														
Connersville								10,000y							
Frankfort		15,490yd				15,490yd	15,490yd	15,490yd							
Gary	1m		1.5m				1m	2m			4m				
Hammond		20,000y	10,000y					4,000y				20m			
Hartford City	None														
Huntington															1ma
Indianapolis	16pd				13pd		14pd	13pd						13pd	4pa
Kingman										o					
Logansport							8,000yd	8,000yd							
Madison	None														
Nappanee								$20,000.00							
Noblesville	None														
Peru	None														
Richmond							50,000y	5,500y		15,000y	5,000y				
South Bend	None														
Terre Haute															15ma
Valparaiso												4m			
Vincennes	7m						3m								
Wabash	None														
Warsaw								$20,000							
Iowa—								32,500y							
Belle Plain															
Burlington							1,700l	8,400l							
Carroll	30,525y														
Cedar Falls	40,770y	7,220y					3,500y								
Cedar Rapids	70,000yd	70,000yd					70,000yd							70,000yd	
Clarinda		25,000yd						25,000yd							
Clinton							12,230y	5,000y							
Council Bluffs								68,685y							
Des Moines	6.765y	o		o			o	18,655y							
Dubuque	Not yet determined.														
Emmettsburg							48,000y								
Forest City				2m											
Fort Dodge	Not yet determined.														
Grinnell															oa
Iowa City				42,000y											
Keokuk			1,200y				19,000y	10,000y							
Mason City	85,000y							4m							
Sigourney								1,000l							
Washington							22,000yd	22,000yd							
West Liberty							40,000y								
Kansas—															
Arkansas City		1m					1m								
Chanute		1md					1md								
Clyde	8m														
Coffeyville	None														
Fort Scott							$60,000								
Fredonia								12,000y							
Holton							$29,000								
Independence							3,000l								
Leavenworth							1,200y					4,720y			
Newton	30,000y						25,000y	10,000y							
Ottawa							20,000y								
Pittsburg							1.6m								
Salina		1m					1.25m								
Topeka		21,700y					29,400y								
Wichita	None														
Kentucky—															
Covington						15,000y	20,000y								
Hopkinsville						1m					2m				
Lexington	5.15m														
Louisville	$110.000d						$110,000d					1,000,000y			
Mayfield	None														
Middlesboro											6m				
Owensboro	$34,440														
Paris	None														

City	Asphalt	Asphalt Concrete	Asphalt Macadam	Bitulithic	Bituminous Concrete	Bituminous Macadam	Brick	Cement Concrete	Granite	Gravel	Macadam	Oiled Macadam	Sandstone	Wood Block	Others
Louisiana															
Alexandria							40,000y			12,000y					12,000yr
Baton Rouge			15,000y												16ma
Shreveport		42,000					2,000								
Maine—															
Old Town	None														
Maryland—															
Baltimore	$14,000								3pd					1pd	
Massachusetts—															
Adams								14,000l							
Beverly			15,000y												
Boston						1p									
Brookline				3,500l		10,000l								9,000l	
Cambridge	Not yet determined.														
Gloucester			1.5m												
Lawrence									9,000y						
Lowell						40,000y			30,000y	75,000y					
Malden	Not yet determined.														
Newburyport									0.75m		6,000y				
Palmer										$900.00					
Revere						2m			0.5m		2m	14m		200y	
Salem	2,000y			3,500y						11,000y	54,600y				
Stoneham				2m		5,000l						2m			
Webster	Not yet determined.														
Westfield					6,200y										
Woburn	None														
Michigan—															
Alpena								12,000y							
Ann Arbor		19,000y						2,000y							
Benton Harbor		7,000y					37,000y								
Cadillac							1,123y	2.5m			1.47m				
Detroit														145,000y	
Dowagiac								o							
Flint	84,950y						26,590y								1,960ys
Ionia	Not yet determined.														
Manistee								4,000y							
Marquette			0.75m							1m	1.500l				
Menominee		5,000y					900y				4,000y				
Monroe								1,200l						240l	
Port Huron							5,000y		1.5m						
Royal Oak								4.5m							
Saginaw	33,500y													14,300y	
Minnesota—															
Austin														13,048y	
Duluth	17,000y						55,000y	60,000y		3,000y	15,000y		3,000y		
Eveleth															1,800la
Mankato														20,000y	
Owatonna	None														
St. Cloud								20,000y							10,650yr
Mississippi—															
Gulfport															70,000ya
Hattiesburg										2m					
Laurel	5,700y														
Meridian															28,660yi
Vicksburg															5.5mi
Missouri—															
Carthage	None														
Columbia			1,110y					4,083y							
Kansas City	od						od							od	
Maryville					26b										
St. Louis							5p								
Sedalia							40,000y	10,000y							
Webb City										1m					
Montana—															
Billings				35,000y											75,000ya
Bozeman				40,000y											
Great Falls				9,200y											
Helena							10,000y								
Missoula		10,305yd	10,305yd	10,305yd			10,305yd							10,305yd	
Nebraska—															
Beatrice		5md					5md								
Columbus				50,134y											
Grand Island							20,000y								
Lincoln	10,000y	70,000y					20,000y								
Omaha	35,408y	20,721y					34,818y	12,550y	7,106l						11,572yh
								53,061l							3,936yq
S. Omaha		11,350y					20,450y	20,780y							21,060ya
New Hampshire—															
Laconia					1,500y	5,000y			1,000y						
New Jersey—															
Bayonne	94,300y				17,800y				13,850y		35,900yv				
Dover	None														
Garfield	Not yet determined.														
Montclair		1m				2,000l									
Newark									9,200yd					9,200yd	
Perth Amboy							0.5m		1.5b						
Phillipsburg							20,800yd							20,800yd	
Princeton		13,000y													
Ridgewood							18,000y				10,000y				
Roselle Park								on							
Wallington	Not yet determined.														
Westfield											20,000y				
New Mexico—															
Roswell		35,355y													
Silver City	12b														

City	Asphalt	Asphalt Concrete	Asphalt Macadam	Bitulithic	Bituminous Concrete	Bituminous Macadam	Brick	Cement Concrete	Granite	Gravel	Macadam	Oiled Macadam	Sandstone	Wood Block	Others
New York—															
Batavia						3,000l	3,000l								
Corning							956y								
Cortland						5,000y									
Dunkirk															15mv
Elmira							10,000y								
Geneva	7,127y						10,610y								
Gloversville							1,400y	10,000y		28,000yd	7,000y	28,000yd			
Herkimer				11,898yd			11,898yd								
Hornell	Not yet determined.														
Hudson						27,000y									
Jamestown							o	o							
Kingston	All work will be done by the city.														
New York City—															
Bronx Boro.	173,700y				65,500y				110,200g						1,100z
Newburgh	12,000ydz			12,000yd			8,265		110,200y						1,100z
Norwich						1p									
Oswego															$35,000a
Pelham Manor															$20,000a
Plattsburg							3,000y		2,000y		10,000y				
Poughkeepsie	Proposals not yet made up.														
Schenectady	1m	3m							0.5m						
Utica	2.61md	2.61md		2.61md			2.61md						315y		$45,000v
Watertown							1p							7,600y	
North Carolina—															
Charlotte	4,500y														
Durham			25,000y												
Fayetteville	Nothing yet determined.														
Goldsboro							3,000y			2,000y					
Kinston	12,000yd			12,000yd			12,000yd								
Newbern	None														
North Dakota—															
Minot	None														
Ohio—															
Akron				5,300y			125,417y								
Athens							5,469y								
Cambridge							15,000y	15,000y							
Chillicothe							2,240y								3,600ya
Cincinnati	29,680 y			5,150y		15,325y	37,352y	920y	17,700y		11,870y			3,700y	100,000yg
Cleveland							23m						2m		
Columbus															144pa
Coshocton							2,000l								
Dayton							80,400y	2,800y		2m				3,670y	
Delaware	None														
E. Liverpool							2m								
Fremont							$24,000.00								
Greenville								5,000y							
Hamilton	$32,000														
Lancaster							35,722y								
London	1pd						1pd							1pd	
Lorain		10,000y					20,000y								
Mansfield							27,079y								
Marion	8,000y						17,000y								
Middletown	33,000y									1m					
Nelsonville							1¼m								
Newark							3,590y								
Newcomerstown															ao
Norwood			3p			9,200y			4,600l						
Painesville							20,600y			2.5m					
Portsmouth							10b								
Sandusky															$20,000a
Springfield															$48,647as
Steubenville															$17,500a
Tiffin															$75,000a
Tippecanoe															$2,000a
Troy					18,000y	8,300y	18,000y			1,050y					
Warren							6.2m								
Wash. Ct. House	0.5m						3m								
West Park															$11,000a
Wooster							8,730y								
Oklahoma—															
Bartlesville	None														
Chickasha	None														
Durant							12b					17,600y			
Enid	None														
Tulsa	40,000y	10,000y					2,000y	8,000y							
Oregon—															
Astoria				20,000y			1,500y							1,000y	
Baker City	None contemplated.														
Eugene		19,000y		16,000y											
Medford	None														
Portland	.32m	8.17m		2.12m					.61m	.73m		6.58m			15.3ma
Pennsylvania—															
Allentown	36,070y						8,000y								
Archbald															$60,000a
Ashley		9,000y													
Beaver							6,000y								
Bradford							786y								
Carbondale							45,000y							8,000y	
Carlisle							13,520y	3,500y							
Catasauqua		2,700y													
Coaldale							1m								
Coraopolis	None														
Dubois							5,000y	3,000y							
E. Pittsburgh	None														
Erie	50,000y														
Farrell	None														
Franklin							16,250y								
Freeland	None														
Glassport	None proposed.														

City	Asphalt	Asphalt Concrete	Asphalt Macadam	Bitulithic	Bituminous Concrete	Bituminous Macadam	Brick	Cement Concrete	Granite	Gravel	Macadam	Oiled Macadam	Sandstone	Wood Block	Others
Homestead							1,100y								
Jersey Shore							o	o							
Juniata								17,892l							
Kane	None														
Lebanon														4b	
McKeesport							$10,000								
Meadville	Not decided yet.														
Middletown	None														
Milton															1ma
Monaca															$20,000a
Morristown	None contemplated.														
Nanticoke								6m					4m		
N. Braddock							1.5m								
Oil City							8,400y							1,600y	
Philadelphia															3ba
Pittsburgh	5,225l					1,200l	800l							1,300l	Foot note
Plymouth	None														
Tamaqua	None														
Titusville	None														
Tyrone	Not yet determined.														
Williamsport							27,486y								
Windber	None														
Rhode Island—															
Cumberland						2m									
Newport			21,850y											10,000y	
Pawtucket	Not yet determined.														
Westerley	Not yet determined.														
Woonsocket	No estimate yet.														
South Carolina—															
Anderson	$250,000d	$250,000d		$250,000d			$250,000d								
Blackville															$14,000a
Columbia	45,000y														
Greenville															20,000ya
Newberry	None														
Orangeburg							4,000y							2,000y	
South Dakota—															
Lead						734y	3,600yd	4,128y						3,600yd	
Sioux Falls		63,000y						10,000y	1,950y						
Tennessee—															
Jackson							29,848y								
Johnson City	2m											2m			
Texas—															
Abilene	Not yet determined.														
Corsicana			1m							7m					
Ennis			50,000yd				50,000yd							50,000yd	
Ft. Worth											3p				
Houston							3p								2.6ma
Laredo															ao
Lufkin				16,000y											
Paris		2md		2md											
Sulphur Spgs							35,000y								
Taylor				7m				7m							
Terrell	1pd			1pd			1pd			1pd				1pd	
Virginia—															
Danville	Not yet determined.														
Newport News	None														
Richmond	Not yet determined.														
Staunton	Not yet determined.														
Washington—															
Aberdeen	20,000y	5,000y						30,000y		5,000y					6,000ye
Bellingham	2m							3m							
Everett	20,000y							15,000y							
Seattle	7m	0.3m					4.m	0.4m					0.2m	0.2m	
Spokane	30,000y						10,000y	40,000y						2,500y	
Vancouver	None														
Walla Walla		20,000y						15,000y							
West Virginia—															
Charleston	3,000yf														71,640ya
Elkins							o								
Huntington							....o								
Parkersburg							100,000y	50,000y							
Wisconsin—															
Appleton	23,000y						6,000y						3,000y		
Beloit	120,000yd	120,000yd					120,000yd	120,000yd			120,000yd			120,000yd	
Fond du Lac								3m							
Green Bay	None														
Jefferson															$25,000a
La Crosse			20,100y				10,200y								
Madison		20,000y				2,000y	2,000y	30,000y							
Marinette								11,000y							
Neenah											2,900l				
New London			1.5md								1.5md				
Racine	None														
Richland Ctr.			18,570yd			18,570yd		18,570yd			18,570yd				
Sheboygan							4,800y	80,000y			7,000y				
Stevens Point								1.5m							
Superior	$31,000	$29,000						$23,000							
Watertown								5,150l							
Wausau						1m									
West Bend						8,216yd					8,216yd				

Foot note—Pittsburgh, Pa. also 23,150 lin. ft. Block Stone, Ligonier and Relaying 400,000 sq. yds. asphalt and 10,000 sq. yds block stone.

a—Kind not decided. b—Blocks of street. d—Of one or more kinds marked with "d" on same line. e—Plank. f—Fibered asphalt. g—Chert. h—Vertical fibre brick. i—Novaculite resurfacing. l—linear feet. m—Miles. n—4-inch concrete base, ⅝-inch oil surface. o—Amount not yet determined. p—Contracts. q—Granite repaving, using old foundation. r—Resurfacing with Tarvia. s—Paving and sewers. v—Resurfacing. y—Sq. yds. z—Asphalt blocks.

COUNTY ROADS—1915.

City and County	Bituminous Concrete	Bitulithic	Bituminous Macadam	Brick	Cement Concrete	Gravel	Macadam	Others
Alabama—								
State	$200,000.00 available from the state for state aid roads.							
Andalusia, Covington	None							
Clanton, Chilton	.....	.....	.....	.....	.....	50m	.....	.....
Geneva, Geneva	8m. of state aid roads.			.....	.....	.....	.....	35mc
Guntersville, Marshall	None.							
Hamilton, Marion	.....	.....	.....	.....	.....	5m	.....	.....
Jasper, Walker	None.							
Luverne, Crenshaw	Some road construction already contracted for.							
Monroeville, Monroe	.....	.....	.....	.....	.....	3m	.....	.....
Prattville, Autauga	None.							
Scottsboro, Jackson	.....	.....	.....	.....	.....	$4,000	.....	.....
Talladega, Talladega	.....	.....	.....	.....	.....	15m	.....	.....
Tuscumbia, Colbert	.....	.....	.....	.....	.....	10m	10m	.....
Arizona—								
State	About $1,500,000.00 will be expended in Arizona in 1915.							
Holbrook, Navajo	.....	.....	.....	.....	.....	5m	.....	.....
Yuma, Yuma	.....	.....	.....	.....	.....	15m	.....	15mk
Arkansas—								
Benton, Saline	None.							
Grannis, Polk	.....	.....	.....	.....	.....	.....	20m	.....
Malvern, Hot Springs	.....	.....	.....	.....	.....	10m	.....	.....
Monticello, Drew	.....	.....	.....	.....	.....	10m	.....	.....
Morrilton, Conway	None.							
Paragould, Green	.....	.....	.....	.....	.....	50m	.....	.....
California—								
State	500 to 600 miles of Calif. State highways.							
Colusa, Colusa	None.							
Downieville, Sierra	None.							
El Centro, Imperial	No official action yet.							
Eureka, Humboldt	None.							
Fairfield, Solano	.....	.....	1m	.....	45ms	.....	.....	.....
Los Angeles, Los Angeles	.....	.....	.....	.....	8m	.....	102ma	25me
Markleville, Alpine	Roads turned over to the state.							
Marysville, Yuba	.....	.....	.....	.....	10ms	.....	.....	.....
Redwood City, San Mateo	.....	.....	.....	.....	.....	2.5m	11m	2ma
Salinas, Monterey	$570,000.00 on roads and bridges.							
San Diego, San Diego	.....	.....	12,250l	.....	.....	.....	.....	.....
Santa Ana, Orange	.....	.....	.....	.....	45m	.....	.....	.....
Visalia, Tulare	.....	.....	.....	.....	10ms	.....	.....	.....
Woodland, Yolo	.....	.....	.....	.....	10ms	.....	.....	.....
Colorado—								
State	Probably $350,000.00 available for grading, culverts, bridges and roads.							
Connecticut—								
State	Appropriation of $853,733.37 to expend to Oct. 1, 1915.							
Delaware—								
Georgetown, Sussex	.....	.....	.....	.....	.....	.....	.....	$40,000r
Florida—								
Brooksville, Hernando	.....	.....	.....	.....	.....	.....	r	.....
De Funiak Springs, Walton	None.							
Green Cove Springs, Clay	.....	.....	.....	.....	.....	23m	.....	.....
Key West, Monroe	None.							
Miami, Dade	None.							
Ocala, Marion	None.							
Palatka, Putnam	.....	.....	.....	15m	.....	.....	.....	.....
St. Augustine, St. John	.....	.....	.....	65m	.....	.....	.....	.....
Tavares, Lake	.....	.....	.....	.....	.....	.....	.....	200mx
Idaho—								
Blackfoot, Bingham	None.							
Grangeville, Idaho	None.							
Lewiston, Nez Perce	.....	.....	.....	.....	.....	.....	8m	.....
Illinois—								
State	9 miles concrete and brick, 35 miles resurfacing, 50 miles gravel and macadam.							
Albion, Edwards	.....	.....	.....	7m	.....	.....	.....	.....
Aledo, Mercer	.....	.....	.....	.....	8,000l	.....	.....	.....
Alton, Madison	.....	.....	.....	.....	.....	.....	.....	$29,982b
Ancona, Livingston	.....	.....	.....	.....	.....	.....	20m	.....
Cambridge, Henry	.....	.....	.....	.....	2m	.....	.....	.....
Canton, Fulton	.....	.....	.....	2.5m	0.5m	.....	.....	.....
Carlyle, Clinton	.....	.....	.....	.....	9,250y	.....	.....	.....
Carmi, White	.....	.....	.....	.....	700l	6.5m	.....	.....
Danville, Vermillion	.....	.....	.....	60md	60md	.....	.....	.....
Effingham, Effingham	.....	.....	.....	.....	1.5m	.....	.....	.....
Freeport, Stephenson	.....	.....	.....	1md	1md	5m	.....	.....
Highland, Madison	.....	.....	.....	.....	5.800l	.....	.....	.....
Jerseyville, Jersey	.....	.....	.....	6,000l	0.75m	.....	.....	.....
Joliet, Will	.....	.....	.....	1r	1r	.....	.....	.....
Kankakee, Kankakee	.....	.....	.....	.....	4l	.....	10l	.....
Lawrenceville, Lawrence	.....	.....	.....	.....	2m	.....	.....	.....
Mackinaw, Tazewell	.....	.....	.....	.....	1.5mb	6mb	.....	.....
Marion, Williamson	.....	.....	2m	.....	1.25m	.....	.....	.....
Monmouth, Warren	.....	.....	.....	7,000l	.....	.....	.....	.....
Monticello, Piatt	.....	.....	.....	4.5m	.....	.....	.....	.....
Morris, Grundy	.....	.....	.....	.....	9,400l	.....	.....	.....
Mound City, Pulaski	.....	.....	.....	.....	.....	4m	1.5m	.....
Mt. Carroll, Carroll	.....	.....	.....	.....	2mb	.....	2m	10mf
Nashville, Washington	.....	.....	.....	3.5md	3.5md	.....	3m	.....
Oswego, Kendall	.....	.....	.....	.....	7,300l	35m	.....	.....
Paris, Vermillion	.....	.....	.....	.....	.....	10,254l	.....	.....
Princeton, Bureau	.....	.....	.....	.....	4mb	5m	.....	20mf
Robinson, Crawford	.....	.....	.....	.....	4mb	6m	4.5m	.....
Rockford, Winnebago	.....	.....	.....	.....	3m	.....	10m	.....
Rushville, Schuyler	.....	.....	.....	.....	5,400l	.....	.....	.....

STREET GRADING IN CITIES—1915.

Arkansas—
Pine Bluff: About 8 miles.

California—
San Jose: 5 miles.
Santa Rosa: 310,000 sq. ft.

Colorado—
Canon City: 3 miles.

Connecticut—
Branford: 6 miles.
Bristol: 2.5 miles.
Rockville: 2 miles.
Torrington: 1 mile.
Waterbury: $10,700 city labor.

Georgia—
La Grange: 69,000 cu. yds.
Valdosta: 2 miles.

Illinois—
Elgin: 10 miles.
Oak Park: 5 miles.

Kansas—
Hutchinson: 10 miles.
Salina: 12,000 cu. yds.
Topeka: 21,000 cu. yds.

Kentucky—
Hopkinsville: 3 miles.
Mayfield: 2 miles.

Massachusetts—
Gloucester: About 3 miles.

Michigan—
Benton Harbor 2 miles.
Cadillac: 4 miles.
Manistee: 700 cu. yds.

Minnesota—
Austin: 40 blocks.
Everett: $7,000.
Mankato: One-half mile.

Mississippi—
Meridian: 23,214 cu. yds.

Missouri—
Carthage: 2 miles.
Sedalia: 1½ miles.
Webb City: 1½ miles.

Montana—
Billings: 10 miles.
Great Falls: 2,000 ft.

Nebraska—
Omaha: 200,000 cu. yds.
South Omaha: 60,000 cu. yds. or more.

New Hampshire—
Laconia: 1 mile.

New Jersey—
Montclair: 2 miles.

New York—
Corning: 7 miles.
Norwich: 20 miles.
Schenectady: 1 mile.

North Carolina—
Charlotte: 4½ miles.

North Dakota—
Minot: 2 miles.

Ohio—
Cleveland: 3,200 cu. yds.
Painesville: 2 miles.
Troy: 3,000 cu. yds.

Oregon—
Astoria: 70,000 cu. yds.
Medford: 3 miles.
Portland: 18.1 miles.

Pennsylvania—
Freeland 1,500 ft.
Juniata 22,000 cu. yds.
Nanticoke: About 2 miles.
Oil City: 2,700 cu. yds.

South Dakota—
Lead: 3,463 ft.
Sioux Falls: 2 miles.

Texas—
Taylor: 2 miles.

Virginia—
Newport News: 25,000 cu. yds.

Washington—
Aberdeen: 500,000 cu. yds. by sluicing.
Everett: About 2 miles.
Seattle: 20 miles.
Spokane: 2 miles.

Wisconsin—
Neenah: 2 miles.
Sheboygan: 20,000 cu. yds.

City and County	Bituminous Concrete	Bitulithic	Bituminous Macadam	Brick	Cement Concrete	Others	Gravel	Macadam
Shelbyville, Shelby	.....	.....	.....	.....	6,500l	.....	.....	.....
Springfield, Sangamon	.....	.....	.....	4,000y	4,200y	4i	.....	.....
Stockton, Jo Daviess	.....	.....	.....	.....	8,000l	.....	.....	.....
Tuscola, Douglas	.....	.....	.....	6,000l	2m	.....	5.5m	.....
Watseka, Iroquois	.....	.....	.....	.....	1.5m	5m	2.5m	.....
Waukegan, Lake	Nothing definite yet.							
Indiana—								
Bloomfield, Green	.....	.....	.....	.....	.....	.....	r	.....
Bluffton, Wells	.....	.....	.....	.....	.....	1r	10r	1rk
Boonville, Warrick	.....	.....	.....	.....	.....	.....	15m	.....
Brownstown, Jackson	.....	.....	.....	.....	6m	8m	.....	.....
Columbia City, Whitley	.....	.....	.....	.....	.....	70m	5m	.....
Columbus, Bartholomew	.....	.....	.....	.....	.....	.....	.....	$15,280r
Dana, Vermillion	.....	.....	.....	0.75m	0.75m	12m	.....	.....
Evansville, Vanderburg	.....	.....	.....	.....	.....	.....	.....	$12,000r
Fairland, Shelby	.....	.....	.....	.....	1.300l	31m	7m	.....
Flora, Carroll	.....	.....	.....	.....	.....	$13,250	.....	.....
Goshen, Elkhart	.....	.....	.....	5m	.....	3m	4mh	.....
Greencastle, Putnam	.....	.....	1.5m	.....	.....	2m	15m	.....
Greenfield, Hancock	.....	.....	.....	.....	.....	3m	4.25m	.....
Hagerstown, Wayne	.....	.....	.....	.....	0.5m	3m	.....	.....
Kentland, Newton	.....	.....	.....	.....	.....	.....	$7,828	$8,160r
Laporte, Laporte	.....	.....	.....	.....	.....	$4,600	.....	$37,400r
Lagro, Wabash	.....	.....	.....	.....	.....	.....	.....	$20,000r
Lebanon, Boone	.....	.....	.....	.....	.....	r	.....	.....
Lawrenceburg, Dearborn	.....	.....	3m	.....	1.2m	.....	7.75m	.....
Madison, Jefferson	.....	.....	.....	.....	.....	.....	12,000l	.....
Martinsville, Morgan	.....	.....	.....	.....	.....	16m	2.5m	.....
Monticello, White	.....	.....	.....	.....	.....	.....	.....	$12,000r
Mt. Vernon, Posey	.....	.....	.....	.....	.....	$27 700	.....	$31,600r
Peru, Miami	.....	.....	.....	.....	3m	20m	.....	1mn
Petersburg, Pike	.....	.....	.....	.....	.....	.....	$13,585	.....
Plymouth, Marshall	.....	.....	.....	.....	.....	60m	.....	.....
Portland, Jay	.....	.....	.....	.....	.....	.....	.....	$34,000r
Princeton, Gibson	.....	.....	.....	.....	.....	.....	3m	$13,000r
Rockville, Parke	.....	.....	.....	.....	3m	14.6m	.....	.....
Salem, Washington	.....	.....	.....	.....	.....	$4,198	.....	44,923ir
Shelbyville, Shelby	.....	.....	.....	.....	.....	10,404l	5,692l	.....
South Bend, St. Joseph	.....	.....	.....	.....	17m	8m	.....	.....
Spencer, Owen	.....	.....	.....	.....	.....	6,751l	50,806l	.....
Sullivan, Sullivan	.....	.....	.....	.....	.....	5m	.....	.....
Terre Haute, Vigo	.....	.....	.....	.....	.....	1i	1i	.....
Upland, Kosciusko	.....	.....	.....	.....	.....	.....	.....	$22,847r
Vevay, Switzerland	.....	.....	.....	.....	.....	.....	10m	.....
Vincennes, Knox	.....	.....	.....	.....	1m	20m	.....	6mg
Washington, Davis	.....	.....	.....	.....	.....	.....	.....	21m
Winamac, Pulaski	.....	.....	.....	.....	.....	15m	8m	.....
Wolcott, White	.....	.....	.....	.....	.....	.....	.....	$11,345r
Worthington, Green	.....	.....	.....	.....	.....	.....	.....	$2,778r
Iowa—								
State	250,000y	200,000y	.....	450,000y	450,000y	200m	300,000yk	75,000yp
Brett, Hancock	.....	.....	.....	.....	.....	6m	.....	.....
Clarion, Wright	.....	.....	.....	.....	.....	15m	.....	.....
Clinton, Clinton	.....	.....	.....	.....	.....	4m	.....	.....
Davenport, Scott	.....	.....	.....	.....	.....	3m	.....	.....
Des Moines, Polk	.....	.....	.....	.....	.....	3m	.....	.....
Dubuque, Dubuque	.....	.....	.....	.....	.....	20.4m	.....	.....
Estherville, Emmett	.....	.....	.....	.....	.....	3m	.....	.....
Ft. Dodge, Webster	.....	.....	.....	.....	.....	3m	.....	.....
Knoxville, Marion	.....	.....	.....	.....	.....	.....	.....	4mr
Logan, Harrison	.....	.....	.....	.....	.....	0.5m	.....	.....
Manchester, Delaware	.....	.....	.....	.....	.....	2m	.....	.....
Mason City, Cerro Gordo	.....	.....	.....	.....	9,400y	.....	.....	.....
Nevada, Story	.....	.....	.....	.....	.....	5m	.....	.....
Sac City, Sac	.....	.....	.....	.....	.....	7m	.....	.....
Tipton, Cedar	.....	.....	.....	.....	.....	.....	1m	9mj
Kansas—								
Abilene, Dickinson	.....	.....	.....	.....	.....	3m	.....	.....
Clyde, Cloud	.....	.....	.....	.....	.....	3m	.....	.....
El Dorado, Butler	.....	.....	.....	.....	.....	.....	.....	60mj
Emporia, Lyon	.....	.....	.....	.....	.....	.....	.....	$90,000
Fredonia, Wilson	.....	.....	.....	.....	.....	1m	.....	.....
Gates Center, Woodson	.....	.....	.....	.....	.....	.....	1m	.....
Hoxie, Sheridan	.....	.....	.....	.....	.....	.....	.....	11mj
Johnson, Stanton	Nothing.							
Leavenworth, Leavenworth	Nothing.							
Minneapolis, Ottawa	Nothing.							
Mound City, Linn	.....	.....	.....	.....	.....	.....	0.25ma	.....
New Ulysses, Grant	Nothing.							
Russell Springs, Logan	Nothing.							
Topeka, Shawnee	.....	.....	.....	.....	0.5m	1m	.....	.....
Wichita, Sedgwick	.....	.....	.....	.....	.....	2m	.....	.....
Kentucky—								
State	.....	.....	80m	5m	.....	150m	200m	10mk
Ashland, Boyd	.....	.....	.....	2.5m	.....	.....	.....	.....
Bardwell, Carlisle	.....	.....	.....	.....	.....	10m	.....	.....
Bedford, Trimble	.....	.....	.....	.....	.....	.....	2m	.....
Bowling Green, Warren	.....	.....	.....	.....	.....	10m	20m	.....
Brownsville, Edmonson	.....	.....	.....	.....	.....	.....	5m	.....
Burlington, Boone	.....	.....	.....	.....	.....	.....	14m	.....
Caneyville, Grayson	.....	.....	.....	.....	.....	.....	9m	.....
Danville, Boyle	.....	.....	.....	.....	.....	1m	10mh	.....
Frenchburg, Menifee	.....	.....	.....	.....	.....	5m	.....	.....
Glasgow, Barren	.....	.....	.....	.....	.....	8m	6m	.....
Harlan, Harlan	.....	.....	.....	.....	.....	.....	6m	.....
Hodgenville, LaRue	.....	.....	.....	.....	.....	.....	8m	.....
Hyden, Leslie	.....	.....	.....	.....	.....	.....	.....	5mj
Lockwood, Boyd	.....	.....	.....	1.7m	.....	.....	.....	.....
Louisa, Lawrence	Vote on bond May 17.							

ROAD GRADING IN COUNTIES—1915.

Alabama—
Clanton, Chilton county: 35 miles.
Hamilton, Marion county: 40 miles.
Jasper, Walker county: 50 miles.
Talladega, Talladega county: 25 miles.

Arizona—
Holbrook, Navajo county: 10 miles.
Kingman, Mohave county: 30 miles.
Tucson, Pima county: 20 miles.
Yuma, Yuma county: 5 miles.

Arkansas—
Malvern, Hot Springs county: 30 miles.
Monticello, Drew county: 30 miles.
Paragould, Green county: 200 miles.

California—
Eureka, Humboldt county: 4 miles.
Fairfield, Solano county: 5 miles.
Los Angeles, Los Angeles county: 30 miles.
San Diego, San Diego county: About 50 miles.
Weaverville, Trinity county: 4 miles.

Florida—
St. Augustine, St. Johns county: 60 miles.
Tavares, Lake county: 329,630 cu. yds.

Idaho—
About 400 miles of road grading to be done in the state.
Lewiston, Nez Perce county: 75 miles.

Illinois—
Carmi, White county: 300 miles.
Galesburg, Knox county: 500 miles.
Garrison, Hamilton county: 500 miles.
Jerseyville, Jersey county: 500 miles—maintenance.
Kankakee, Kankakee county: 80 to 100 miles.
Louisville, Clay county: 120 miles.
Mackinaw, Tazewell county: 8,000 cu. yds.
Monmouth, Warren county: 20 miles.
Morris, Grundy county: 30 miles.
Mound City, Pulaski county: 400 miles.
Mt. Carroll, Carroll county: 400 miles—maintenance.
Mt. Sterling, Brown county: 500 miles.
Paris, Vermillion county: 2,800 cu. yds.
Peoria, Peoria county: 100 miles.
Princeton, Bureau county: 150 miles.
Robinson, Crawford county: 16 miles.
Rockford, Winnebago county: 20 miles.
Rushville, Schuyler county: 300 miles.
Sorento, Bond county: 400 to 500 miles.
Springfield, Sangamon county: 1,200 miles.
Stronghurst, Henderson county: 100 miles.
Taylorville, Christian county: 850 miles.

Indiana—
Columbia City, Whitley county: 85 miles.
Goshen, Elkhart county: 6 or 7 miles.
Peru, Miami county: 350 miles.
Rockville, Parke county: 25 miles.
Spencer, Owen county: 200 miles.

Iowa—
State estimate, 500 miles.
Adel, Dallas county: $20,000.
Algona, Kossuth county: 7 miles.
Anamosa, Jones county: 25 miles.
Brett, Hancock county: 10 miles.
Carroll, Carroll county: 6 miles.
Centerville, Appanoose county: 40 miles.
Charles City, Floyd county: 60 miles.
Cherokee, Cherokee county: 20 miles.
Clarion, Wright county: 70 miles.
Clinton, Clinton county: 10 miles.
Davenport, Scott county: 3 miles.
Denison, Crawford county: 15 miles.
Des Moines, Polk county: 25,000 cu. yds.
Dubuque, Dubuque county: 50 miles.
Emmetsburg, Palo Alto county: 15 miles.
Estherville, Emmett county: 9 miles.
Fairfield, Jefferson county: 50 miles.
Ft. Dodge, Webster county: 50 miles.
Forest City, Winnebago county: 35 miles.
Greenfield, Adair county: 4 miles.
Hampton, Franklin county: 60 miles.
Ida Grove, Ida county 60 miles.
Iowa City, Johnson county: 40 miles.
Jefferson, Greene county: 10 miles.
Keosauqua, Van Buren county: 15 miles.
Knoxville, Marion county: 4 miles.
Logan, Harrison county: 25 miles.
Manchester, Delaware county: 50 miles.
Mason City, Cerro Gordo county: 20 miles.
Osage, Mitchell county: 125 miles.
Montezuma, Poweshick county: 75 miles.
Nevada, Story county: 20 miles.
Red Oak, Montgomery county: 60 miles.
Rock Rapids, Lyon county: 35 miles.
Sac City, Sac county: 20 miles
Sigourney, Keokuk county: 6 miles.

City and County	Bituminous Concrete	Bitulithic	Bituminous Macadam	Brick	Cement Concrete	Gravel	Macadam	Others
Madisonville, Hopkins	.....	.....	.....	.....	.....	.....	6m	.....
Mason, Grant	.....	.....	.....	.....	.....	.....	8m	.....
Mentor, Campbell	.....	.....	6m	.....	.....	.....	20m	.....
Middlesboro, Bell	.....	.....	.....	.....	.....	.....	6m	.....
Monticello, Wayne	.....	.....	.....	.....	.....	.....	14m	.....
Paducah, McCracken	.....	.....	.....	.....	.....	24m	.....	8mb
Pineville, Bell	.....	.....	.....	.....	.....	.....	34m	.....
Preston, Bath	.....	.....	.....	.....	.....	8mb	1m	.....
Richwood, Madison	.....	.....	.....	.....	.....	.....	10m	20mh
Shelbyville, Shelby	.....	.....	.....	.....	.....	.....	4.5m	.....
Shepherdsville, Bullitt	.....	.....	.....	.....	.....	5m	10m	.....
Stanford, Lincoln	.....	.....	.....	.....	.....	8m	5m	.....
Tomkinsville, Monroe	.....	.....	.....	.....	.....	.....	15m	.....
Vanceburg, Lewis	.....	.....	.....	.....	.....	.....	50m	.....
Versailles, Woodford	.....	.....	3m	.....	.....	.....	30m	2mk
Louisiana—								
Covington, St. Tamany	.....	.....	.....	.....	.....	.....	.....	26mr
Lake Charles, Calcasieu	.....	.....	.....	.....	.....	.....	.....	29mr
Welsh, Jefferson Davis	.....	.....	.....	.....	.....	.....	.....	$400,000
Maine—								
State	About 100 miles of new road construction.							
Maryland—								
Cambridge, Dorchester	.....	.....	.....	.....	.....	.....	.....	b
Centreville, Queen Anne	.....	.....	.....	.....	.....	.....	1m	4mq
Easton, Talbot	.....	.....	.....	.....	1m	.....	.....	11mq
Frederick, Frederick	.....	.....	.....	.....	.....	.....	5m	.....
Rockville, Montgomery	.....	.....	55,000yh	.....	2,112y	.....	40,735ya	30,000yh
Snow Hill, Worcester	.....	.....	.....	.....	3m	.....	.....	.....
Massachusetts—								
State	120md	.....	120md	.....	120md	120md	120md	120md
Michigan—								
Beaverton, Gladwin	.....	.....	.....	.....	.....	37md	.....	37mbd
Corunna, Shiawassee	.....	.....	.....	.....	.....	24m	.....	.....
Crystal Falls, Iron	.....	.....	.....	.....	.....	8m	7.5m	.....
Detroit, Wayne	.....	.....	.....	.....	280,000y	.....	.....	.....
Escanaba, Delta	.....	.....	.....	.....	.....	.....	15m	12mh
Hart, Oceana	.....	.....	.....	.....	.....	.....	1.1m	.....
Hillsdale, Hillsdale	.....	.....	0.5m	0.5m	3m	50m	.....	.....
Houghton, Houghton	None.							
Howell, Livingston	.....	.....	.....	.....	.....	10m	.....	.....
Iron Mt., Dickinson	.....	.....	.....	.....	.....	.....	1m	3ma
Jackson, Jackson	.....	.....	.....	.....	.....	.....	.....	6r
Kalamazoo, Kalamazoo	.....	.....	.....	.....	.....	12m	4.5	.....
Kalkaska, Kalkaska	.....	.....	.....	.....	.....	4m	2m	.....
L'Anse, Baraga	Nothing.							
Manistee, Manistee	.....	.....	.....	.....	.....	7m	1m	.....
Menominee, Menominee	.....	.....	.....	.....	.....	.....	5mb	.....
Mio, Oscoda	None.							
Munising, Alger	.....	.....	.....	.....	.....	.....	.....	2.5mr
Rogers, Presque Isle	.....	.....	.....	.....	.....	5m	.....	.....
St. Ignace, Mackinac	.....	.....	.....	.....	.....	.....	3-6m	.....
Tawas City, Iosco	.....	.....	.....	.....	.....	4m	.....	.....
Traverse City, Grand Traverse	.....	.....	.....	.....	.....	6m	.....	.....
West Branch, Ogemaw	.....	.....	.....	.....	.....	15m	.....	.....
Minnesota—								
State	.....	.....	.....	100md	.....	204md	204md	.....
Alexandria, Douglas	.....	.....	.....	.....	.....	4m	.....	.....
Cambridge, Isanti	.....	.....	.....	.....	.....	10m	0.5m	.....
Foley, Benton	.....	.....	.....	.....	.....	2m	.....	.....
Granite Falls, Yellow Medicine	.....	.....	.....	.....	.....	6m	.....	.....
Ivanhoe, Lincoln	.....	.....	.....	.....	.....	20m	.....	.....
Red Lake Falls, Red Lake	.....	.....	.....	.....	.....	10m	.....	.....
Shakopee, Scott	.....	.....	.....	.....	.....	7m	.....	.....
Walker, Cass	.....	.....	.....	.....	.....	.....	.....	$300,000r
Wheaton, Traverse	.....	.....	.....	.....	.....	4m	.....	.....
Willmar, Kandiyohi	.....	.....	.....	.....	.....	10m	.....	.....
Windom, Cottonwood	.....	.....	.....	.....	.....	10mb	.....	.....
Worthington, Nobles	Nothing yet determined.							
Mississippi—								
Columbus, Lowndes	.....	.....	.....	.....	.....	.....	22m	.....
Missouri—								
Bolivar, Polk	.....	.....	.....	.....	.....	40m	.....	.....
Brays, Miller	.....	.....	.....	.....	.....	40m	.....	.....
Clayton, St. Louis	.....	.....	.....	.....	.....	3m	15m	.....
Columbia, Boone	.....	.....	.....	.....	.....	6m	.....	.....
Dixon, Pulaski	.....	.....	.....	.....	.....	8m	.....	.....
Farmington, St. Francois	None.							
Exeter, Barry	.....	.....	.....	.....	0.25m	5m	.....	.....
Jackson, Cape Girardeau	.....	.....	.....	.....	.....	3m	0.25m	10mf
Jefferson City, Cole	.....	.....	.....	.....	.....	5m	0.5m	.....
Ironton, Iron	.....	.....	.....	.....	.....	3m	.....	.....
Kingston, Caldwell	.....	.....	.....	.....	.....	.....	3m	.....
Linn Creek, Camden	.....	.....	.....	.....	.....	5m	.....	.....
Luray, Clark	.....	.....	.....	.....	.....	16m	5ma	.....
Palmyra, Marion	.....	.....	.....	.....	2.5m	12m	4m	.....
Potosi, Wash.	.....	.....	.....	.....	.....	9m	5m	.....
Rolla, Phelps	.....	.....	.....	.....	.....	10m	.....	.....
St. Charles, St. Charles	.....	.....	.....	.....	.....	10m	1.5m	.....
Troy, Lincoln	.....	.....	.....	.....	.....	10m	.....	3m
Warrenton, Warren	.....	.....	.....	.....	.....	3m	.....	.....
Montana—								
Glasgow Valley	Too early for estimate.							

ROAD GRADING
(Continued)

Tipton, Cedar county: 155 miles.
Toledo, Tama county: 8 miles.
Washington, Washington county: 10 miles heavy grading; 35 miles tractor.

Kansas—

Abilene, Dickinson county: 50 miles.
Ashland, Clark county: About 35 miles.
Beloit, Mitchell county: 80 miles new; 80 miles regrading.
Cimarron, Gray county: 25 miles.
Clyde, Cloud county: 173 miles regrading.
Council Grove, Morris county: 50 miles.
Dodge City, Ford county: 200 miles.
El Dorado, Butler county: 60 miles new.
Fredonia, Wilson county: 25 miles.
Greensburg, Kiowa county: 75 to 100 miles.
Holton, Jackson county: 115 miles.
Hoxie, Sheridan county: 4 miles.
Iola, Allen county: 20 miles.
Jetmore, Hodgeman county: 68 miles.
Lakin, Kearney county: 30 miles.
Leavenworth, Leavenworth county: 136 miles—maintenance.
Lyndon, Osage county: 40 miles.
Newton, Harvey county: 33 miles.
Russell, Russell county: 15 miles.
Sabetha, Nemaha county: 90 miles.
Topeka, Shawnee county: 210 miles.
Tribune, Greeley county: 20 miles.
Wichita, Sedgwick county: 100 miles.

Kentucky—

Bardwell, Carlisle county: 400 miles.
Bedford, Trimble county: 40 miles.
Bowling Green, Warren county: 10 miles.
Burlington, Boone county: 275 miles.
Dixon, Webster county: 500 miles.
Henderson, Henderson county: 628 miles—maintenance.
Hodgenville, LaRue county: 350 miles.
Madisonville, Hopkins county: 6 miles.
Mentor, Campbell county: 20 miles
Paducah, McCracken county: 300 miles.
Pineville, Bell county: 34 miles.
Owingsville, Bath county: 25 miles.
Richmond, Madison county: 590 miles—maintenance.
Stanford, Lincoln county: 100 miles.
Vanceburg, Lewis county: 50 miles.
Versailles, Woodford county: $42,000.

Maryland—

Easton, Talbot county: 20 miles.

Michigan—

Bessemer, Gogebic county: 3½ miles.
Crystal Falls, Iron county: 20 miles.
Escanaba, Delta county: 26 miles.
Hillsdale, Hillsdale county: 20 miles.
Iron Mountain, Dickinson county: 5½ miles.
Kalkaska, Kalkaska county: 5 miles.
Manistee, Manistee county: 7 miles.
Rogers, Presque Isle county: 5 miles.
St. Ignace, Mackinac county: 36 to 40 miles.
Traverse City, Grand Traverse county: 3 miles.

Minnesota—

Alexandria, Douglas county: 12 miles.
Bemidji, Beltrami county: 82 miles.
Blue Earth, Faribault county: About 8 miles.
Fairmont, Martin county: 10 to 15 miles.
Foley, Benton county: 15 miles.
Granite Falls, Yellow Medicine county: 15 miles.
Ivanhoe, Lincoln county: 26 miles.
Le Sueur Center, Le Sueur county: 25 miles.
Mora, Kanabec county: 12½ miles.
Red Lake Falls, Red Lake county: 25 miles.
Wheaton, Traverse county: 15 miles.
Willmar, Kandiyohi county: 30 miles.
Windom, Cottonwood county: 40 miles.

Missouri—

Bethany, Harrison county: 120,000 cu. yds.
Brays, Miller county: 125 miles.
Buffalo, Dallas county: 35 miles.
Columbia, Boone county: 1,000 miles.
Dixon, Pulaski county: 40 miles.
Exeter, Barry county: 75 miles.
Fulton, Callaway county: 7 miles.
Jackson, Cape Girardeau county: 5 miles.
Jefferson City, Cole county: 50 miles.
Ironton, Iron county: 5 miles.
Kingston, Caldwell county: 20 miles.
Lentner, Shelby county: 300 miles.
Linn Creek, Camden county: 15 miles.
Luray, Clark county: 700 miles.
Macon, Macon county: 1,100 ft.

City and County	Bituminous Concrete	Bitulithic	Bituminous Macadam	Brick	Cement Concrete	Gravel	Macadam	Others
Nebraska—								
Blair, Washington	.....	.....	.....	.....	.....	10m	20ma	.....
Brewster, Blaine	None.							
Grant, Perkins	None.							
Harrisburg, Banner	None.							
New Jersey—								
Belvidere, Warren	.....	.....	.....	.....	.....	.....	8.66m	.....
Newton, Sussex	.....	.....	.....	.....	.....	.....	5m	.....
Mt. Holly, Burlington	None.							
Somerville, Somerset	.....	.....	.....	.....	.....	.....	2.71m	.....
New Mexico—								
State	$488,185 available for road construction in 1915.							
Alamagorda, Otero	.....	.....	.....	.....	.....	.....	3m	.....
Las Cruces, Dona Ana	.....	.....	.....	.....	.....	35m	2ma	.....
Las Vegas, San Miguel	.....	.....	.....	.....	.....	30m	.....	.....
Raton, Colfax	.....	.....	.....	.....	.....	.....	.....	$16,000
New York —								
State	.....	.....	275md	275md	275md	.....	275md	.....
Albion, Orleans	Nothing definite.							
Auburn, Cayuga	.....	.....	.....	21ms	.....	20m	25m	.....
Canandaigua, Ontario	.....	.....	0.75m	4.5m	.....	.....	20m	0.5mo
Ellicottville, Cattaraugas	.....	.....	.....	1m	15m	.....	.....	.....
Fonda, Montgomery	.....	.....	1m	.....	.....	.....	3m	20ma
Friendship, Allegany	.....	.....	23m	5m	.....	10m	.....	.....
Herkimer, Herkimer	.....	2.5m	.....	.....	.....	.....	12.25m	5.55mk
Ithaca, Tompkins	.....	.....	.....	.....	6.7m	.....	7m	.....
Johnstown, Fulton	.....	.....	.....	.....	.....	.....	4.5ms	.....
Lockport, Niagara	.....	.....	11m	3m	34m	.....	17m	.....
Malone, Franklin	.....	.....	35m	.....	.....	10m	15m	20ma
Oneida, Madison	.....	.....	.....	.....	.....	.....	25m	5mt
Saratoga Springs, Saratoga	.....	.....	.....	.....	.....	.....	17.2ma	.....
Penn Yan, Yates	.....	.....	.....	0.5m	.....	.....	10.5m	.....
Utica, Oneida	Nothing definite yet.							
Waterloo, Seneca	.....	.....	5m	1.25m	.....	.....	.....	.....
Watertown, Jefferson	.....	.....	30ms	2ms	8ms	.....	50m	.....
Watkins, Schuyler	.....	.....	26,000l	10,000l	41,700l	.....	14,000la	.....
North Carolina—								
Bryson City, Swain	.....	.....	.....	.....	.....	.....	20m	.....
Camden, Camden	None.							
Edenton, Chowan	None.							
Glen Alpine, Burke	None.							
Greensboro, Guilford	12m	.....	.....	.....	.....	.....	.....	.....
Hillsboro, Orange	None.							
Kernersville, Forsyth	.....	.....	2mh	.....	.....	.....	.....	.....
Lexington, Davidson	.....	.....	.....	.....	.....	.....	.....	$300,000r
Mt. Airy, Surry	0.5m	.....	.....	.....	.....	.....	.....	.....
Troy, Montgomery	.....	.....	.....	.....	.....	50m	.....	.....
Wilmington, New Hanover	.....	.....	.....	.....	.....	7.5m	.....	.....
North Dakota—								
Crosby, Divide	.....	.....	.....	.....	.....	$40,000	.....	.....
Stanton, Mercer	None.							
Ohio—								
State	.....	.....	.....	16.1m	37.2m	.....	14.8m	.....
Akron, Summit	.....	.....	.....	12.25m	.....	.....	.....	2,000lp
Bainbridge, Ross	.....	.....	.....	.....	.....	.....	.....	$10,000r
Bowling Green, Wood	.....	.....	.....	.....	.....	.....	30m	.....
Cambridge, Guernsey	.....	.....	.....	.....	.....	.....	2ma	.....
Canton, Stark	.....	.....	8.5m	6.1m	.....	.....	6m	.....
Celina, Mercer	.....	.....	.....	4,000l	7.6m	60md	60md	.....
Cincinnati, Hamilton	.....	.....	.....	12m	.....	3m	10m	8,000lt
Columbus, Franklin	.....	.....	.....	.....	.....	.....	40m	.....
Dayton, Montgomery	.....	.....	3m	5m	.....	.....	.....	.....
Defiance, Defiance	.....	.....	.....	.....	4m	25m	35m	.....
Delaware, Delaware	.....	.....	.....	.....	.....	.....	.....	20mr
Diamond, Portage	.....	.....	.....	.....	.....	.....	.....	$7,000
Eaton, Preble	.....	.....	.....	.....	.....	.....	10ma	.....
Fostoria, Seneca	.....	.....	.....	.....	.....	.....	.....	$33,000r
Hillsboro, Highland	.....	.....	.....	.....	.....	3m	10m	.....
Howard, Knox	.....	.....	.....	2.75m	.....	2m	3m	.....
Jefferson, Ashtabula	.....	.....	.....	124,870y	107,768y	.....	.....	1,075yo
Logan, Hocking	.....	.....	.....	3.25m	.....	.....	1.5m	.....
London, Madison	.....	.....	.....	.....	.....	.....	.....	16mk
Mansfield, Richland	.....	.....	.....	5ms	0.75ms	9m	15m	10mas
Marietta, Washington	.....	.....	.....	.....	35m	.....	.....	.....
Marysville, Union	.....	.....	.....	.....	4.5m	14m	8m	10mg
McConnelsville, Morgan	.....	.....	.....	2.5m	.....	.....	1.85m	.....
Medina, Medina	.....	.....	.....	2.5m	8m	.....	.....	.....
Millersburg, Holmes	.....	.....	.....	1.6m	0.5m	.....	0.5m	.....
Mt. Gilead, Morrow	.....	.....	.....	.....	.....	.....	25m	.....
Newark, Licking	Some State Aid roads.							
North Lima, Mahoning	.....	.....	.....	.....	.....	.....	.....	$12,000r
Nova, Ashland	.....	.....	.....	.....	.....	.....	.....	$26,000r
Ottawa, Putnam	.....	.....	.....	.....	.....	.....	65m	.....
Painesville, Lake	.....	.....	.....	7.5m	.....	.....	4mh	.....
Ravenna, Portage	.....	.....	.....	5m	8m	.....	2m	.....
St. Clairsville, Belmont	.....	.....	3m	23m	5m	.....	.....	.....
Toledo, Lucas	15md	.....	15md	.....	.....	.....	.....	45mh
Troy, Miami	.....	.....	14m	.....	0.5m	.....	.....	30mh
Urbana, Champaign	.....	.....	.....	.....	2m	.....	1.5m	.....
Van Wert, Van Wert	.....	.....	.....	.....	.....	.....	1m	.....
Wakeman, Huron	.....	.....	.....	.....	.....	.....	.....	$13,000r
Washington, Fayette	.....	.....	.....	5m	.....	$15,000hd	$15,000hd	.....
Wauseau, Fulton	.....	.....	.....	.....	.....	.....	17m	4.5mk
Waverley, Pike	.....	.....	.....	.....	.....	.....	8m	.....
Wilmington, Clinton	.....	.....	.....	.....	.....	.....	10m	.....
Woodsfield, Monroe	.....	.....	.....	1m	1m	.....	.....	.....
Youngstown, Mahoning	.....	.....	.....	.....	.....	.....	.....	$132,000r
Zanesville, Muskingum	.....	.....	.....	1m	1m	.....	12m	.....

ROAD GRADING
(Continued)

New Madrid, New Madrid county: 150 miles.
Ozark, Christian county: 30 miles.
Palmyra, Marion county: 200 miles.
Troy, Lincoln county: 25 miles.
Warrenton, Warren county: 125 miles.

Montana—

Bozeman, Gallatin county: 50 miles.
Great Falls, Cascade county: 200 miles.
Roundup, Musselshell county: 319 miles.

Nebraska—

Beatrice, Gage county: 25 miles.
Blair, Washington county: 300 miles.
Center, Knox county: 50 miles.
Fremont, Dodge county: 10 miles.
Kimball, Kimball county: 3 miles
Osceola, Polk county: 50 miles
Pender, Thurston county: 10 to 20 miles
Sidney, Cheyenne county: 30 miles
Springview, Keyapaha county: 10 miles

New Jersey—

Newton, Sussex county: 50,000 cu yds.

New Mexico—

Alamogordo, Otero county: 30 miles.
Las Cruces, Dona Ana county: 33 miles
Portales, Roosevelt county: 170 miles.
Raton, Colfax county: 21 miles.

New York—

Auburn, Cayuga county: 100 miles.
Canandaigua, Ontario county: 25 miles.
Fonda, Montgomery county: 50 miles.
Friendship, Allegany county: 200 miles.
Ithaca, Tompkins county: 600 miles.
Lockport, Niagara county: 12 miles.
Malone, Franklin county: 50 miles.
Watkins, Schuyler county: 150,000 cu. yds.

North Carolina—

Bryson City, Swain county: 20 miles.
Kernersville, Forsyth county: 10 miles.
Marshall: 6.9 miles.
Mt. Airy, Surry county: 35 miles.
Troy, Montgomery county: 75 miles.
Wentworth, Rockingham county: 50 miles.

North Dakota—

Center, Oliver county: 10 to 15 miles.
Crosby, Divide county: $40,000.
Dickinson, Stark county: 25 miles.
Rolla, Rolette county: 20 to 30 miles.

Ohio—

Celina, Mercer county: 67.6 miles.
Columbus, Franklin county: 30 miles.
Howard, Knox county: 7 miles.
Marietta, Washington county: 8 miles.
Mt. Gilead, Morrow county: 25 miles.
Troy, Miami county: 100 miles.
Urbana, Champaign county: 3½ miles.
Wauseon, Fulton county: 21½ miles.
Zanesville, Muskingum county: 14 miles.

Texas—

Bay City, Matagorda county: 80 miles.
Dallas, Dallas county: 500 miles, repair.
Edna, Jackson county: 12 miles.
Hillsboro, Hill county: 55 miles.
Lockhart, Caldwell county: 10 miles.
Mason, Mason county: 15 miles.
New Braunfels,Comal county: 35 miles.
Vernon, Wilbarger county: 40 miles.

Virginia—

Courtland, Southampton county: 12 miles.
Grundy, Buchanan county: 3 to 5 miles.
Oldtown, Grayson county: 2 miles.
Rosslyn, Alexandria county: One-half mile.

Wisconsin—

State estimate, 600 miles.
Algoma, Kewannee county: 7 or 8 miles.
Balsam Lake, Polk county: 12 miles.
Danbury, Burnett county: 15 miles.
Darlington, Lafayette county: 25 miles.
Hayward, Sawyer county: 22 miles.
Madison, Dane county: 45 miles.
Milwaukee, Milwaukee county: 38 miles.
Rhinelander, Oneida county: $54,000.
Rice Lake, Barron county: 24 miles.
Richland Center, Richland county: 5 miles.
Shawano, Shawano county: 9 miles.
Sparta, Monroe county: 8 miles.
Sturgeon Bay, Door county: 20 miles.
Superior, Douglas county: 35 miles.

City and County.	Bituminous Concrete	Bitulithic	Bituminous Macadam	Brick	Cement Concrete	Gravel	Macadam	Others
Oklahoma—								
State	Will spend about $3,000,000 for roads and small bridges.							
Pennsylvania—								
Emporium, Cameron	None.							
Lock Haven, Clinton	None.							
McConnellsburg, Fulton	None.							
Pittsburgh, Allegheny	.....	.....	.....	.....	.....	.....	.....	4.21mr
Tionesta, Forrest	None.							
Tunkhannock, Wyoming	None.							
South Carolina—								
State	About $4,000,000 will be spent in construction of permanent highways.							
Tennessee—								
Greeneville, Green	.....	.....	.....	.....	.....	.....	.....	$100,000r
Texas								
Angleton, Brazoria	.....	.....	.....	.....	.....	40m	.....	.....
Bay City, Matagorda	.....	.....	.....	.....	.....	10m	.....	.....
Bellville, Austin	None.							
Bremond, Robertson	.....	.....	.....	.....	.....	50md	.....	50mcd
Clarksville, Red River	Nothing decided yet.							
Dallas, Dallas	.....	.....	.....	.....	.....	5m	10ma	.....
Daingerfield, Morris	None.							
Edna, Jackson	.....	.....	.....	.....	.....	12m	.....	.....
Ft. Worth, Tarrant	.....	.....	.....	.....	10m	40m	.....	.....
Galveston, Galveston	.....	.....	.....	.....	.....	.....	.....	$46,500r
Greenville, Hunt	.....	.....	.....	.....	40m	.....	.....	.....
Hemphill, Sabine	None.							
Henrietta, Clay	None.							
Hillsboro, Hill	.....	.....	.....	.....	2m	40m	.....	5mk
Houston, Harris	.....	.....	.....	2.5m	.....	15m	.....	20mq
Huntsville, Walker	.....	.....	.....	.....	.....	10md	10md	.....
Johnson City, Blanco	None.							
Karnes City, Karnes	.....	.....	.....	.....	.....	.....	175m	.....
Lockhart, Caldwell	.....	.....	.....	.....	.....	.....	15mh	.....
Marshall, Harrison	.....	.....	.....	.....	.....	50md	20md	.....
Montague, Montague	None.							
New Braunfels, Comal	.....	.....	.....	.....	.....	25m	5m	5mc
Palo Pinto, Palo Pinto	.....	.....	.....	.....	.....	.....	.....	36.7mr
Shive, Hamilton	.....	.....	.....	.....	.....	18m	.....	20mc
Vernon, Wilbarger	.....	.....	.....	.....	1.000y	.....	.....	.....
Waco, McLennan	.....	.....	.....	.....	.....	.....	.....	$500,000
Waxahachie, Ellis	None.							
Wharton, Wharton	.....	.....	.....	.....	.....	60m	.....	.....
Wichita Falls, Wichita	.....	.....	.....	.....	.....	4m	.....	.....
Virginia—								
State	10md	.....	10md	.....	.....	125m	160m	400mc
Amherst, Amherst	.....	.....	.....	.....	.....	.....	12m	.....
Bland, Bland	None.							
Buckingham, Buckingham	.....	.....	.....	.....	.....	.....	.....	6mc
Courtland, Southampton	.....	.....	.....	.....	.....	.....	.....	c
Eastville, Northampton	.....	.....	.....	.....	.....	.....	.....	30mc
Harrisonburg, Rockingham	.....	.....	.....	.....	.....	.....	10m	.....
Lunenberg, Lunenberg	.....	.....	.....	.....	.....	.....	.....	c
Palmyra, Fluvanna	None.							
Rosslyn, Alexandria	.....	.....	4m	.....	.....	.....	3m	.....
Suffolk, Nansemond	.....	.....	.....	.....	.....	4m	.....	.....
Washington—								
State	Will spend about $7,000,000 on roads and bridges.							
Bellingham, Whatcom	.....	.....	.....	.....	6m	3m	.....	.....
Chehalis, Lewis	.....	.....	.....	.....	24,665l	.....	.....	.....
Walla Walla, Walla Walla	.....	.....	.....	.....	.....	5m	3m	.....
West Virginia—								
Ceredo, Wayne	.....	.....	.....	2m	.....	.....	.....	.....
Wisconsin—								
State	2m	.....	5m	1m	90m	200m	300m	50ma
Algoma, Kewannee	.....	.....	.....	.....	0.5m	.....	4m	2mo
Baraboo, Sauk	.....	.....	.....	.....	2m	.....	23m	.....
Chippewa Falls, Chippewa	.....	.....	.....	.....	.....	7m	6m	.....
Crandon, Forest	.....	.....	.....	.....	.....	.....	.....	20mj
Darlington, Lafayette	.....	.....	.....	.....	1m	.....	6m	14ma
Eau Claire, Eau Claire	None.							
Fond du Lac, Fond du Lac	.....	.....	.....	.....	.....	4m	.....	16mo
Ft. Atkinson, Jefferson	.....	.....	.....	.....	.....	12m	3m	.....
Janesville, Rock	.....	.....	.....	.....	7,000y	75,000y	75,000y	.....
Madison, Dane	.....	.....	.....	.....	20,000y	5m	35m	.....
Milwaukee, Milwaukee	.....	.....	.....	.....	35m	.....	.....	60,000yn
Nelson, Buffalo	.....	.....	.....	.....	.....	.....	10,000l	1,000la
Oshkosh, Winnebago	.....	.....	.....	.....	0.5m	7m	6m	8ma
Osseo, Trempealeau	.....	.....	.....	.....	2.500y	2m	6m	5mo
Rhinelander, Oneida	.....	.....	.....	.....	.....	2m	.....	.....
Rice Lake, Barron	.....	.....	.....	.....	2,000l	.....	.....	.....
Richland Center, Richland	.....	.....	.....	.....	.....	2m	8m	.....
Shawano, Shawano	.....	.....	.....	.....	.....	2.25m	2m	.....
Sparta, Monroe	.....	.....	.....	0.5m	.....	.....	6m	.....
Stevens Point, Portage	.....	.....	.....	.....	1m	8m	9m	7me
Sturgeon Bay, Door	.....	.....	.....	.....	.....	2m	18m	.....
Superior, Douglas	.....	.....	.....	.....	.....	.....	1.75m	.....
Thiensville, Ozaukee	.....	.....	.....	.....	.....	.....	2.46ma	3.000lk
Wyoming—								
State	Will probably spend $425,000.							

a—Oiled macadam. b—State Aid. c—Sand clay. d—One or more of those on same line marked "d." e—Granite—disintegrated. f—Surface treatment with tar or oil. g—Limestone. h—Resurfacing. i—Contracts for road construction. j—Earth road. k—Asphalt macadam. l—linear feet. m—Miles. n—Asphalt concrete. o—sandstone. p—Wood block. q—Shell. r—Roads. s—State highway. t—Granite. x—Sand-clay, shell, modified asphalt, macadam, Rocmac, oiled macadam. y—Square yards.

SIDEWALKS IN CITIES —1915.

Arizona—
Flagstaff: Cement, 9 miles (public).

Arkansas—
Fort Smith: Cement, 3 miles.
Hot Springs: Cement, 25,000 sq. ft.
Pine Bluff: Cement, 5 miles.

California—
Alhambra: Cement, 5 miles.
Long Beach: Cement, 6 miles.
Los Angeles: Cement, 85 miles (public).
Pasadena: Cement, 4,449 lin. ft.
San Francisco: Cement, 30,000 sq. yds.
San Jose: Cement, 100,000 sq. ft. (private).

Connecticut—
Rockville: Cement, 1,000 lin. ft.
Torrington: Cement, 1 mile.
Waterbury: Tar concrete, $5,000 (city labor).

Florida—
Miami: Cement, 432,000 sq. ft. (public).

Georgia—
Americus: Cement, 5,000 sq. yds.
Rome: Cement, 4,000 sq. yds. (private).
Valdosta: Cement, 4,000 sq. yds.

Illinois—
Alton: Cement, 1,000 lin. ft.
Berwyn: Cement, 50,000 lin .ft.
Chicago Heights: Cement, 3,000 sq. ft.
Decatur: Cement, 3 miles (private).
Elgin: Cement, 3¼ miles (private).
Litchfield: Cement, 3 miles.
Oak Park: Cement, 8.81 miles.
Rushville: Brick, 2 miles; cement, 5 miles.
Waukegan: Cement, 5,000 lin. ft.

Indiana—
Anderson: Cement, 1 mile (public).
Brazil: Cement, 1½ miles.
Crawfordsville: Cement, 3 miles.
Frankfort: Cement, 57,500 sq. ft. (public).
Gary: Cement, 15 miles.
Hammond: Cement, 3 miles.
Huntington: Cement, 10,000 sq. ft.
Logansport: Cement, 2,000 sq. ft.
Richmond: Cement, 30,000 sq. ft.
Valparaiso: Cement, 25,000 lin. ft.
Vincennes: Cement, 1 mile.

Iowa—
Cedar Falls: Cement, 15,000 lin. ft.
Cedar Rapids: Cement, 12 to 15 miles.
Council Bluffs: Cement, 239,631 sq. ft.
Emmettsburg: Cement, 9,000 sq. yds.
Estherville: Cement, 10,000 sq. ft.
Iowa City: Cement, 5 miles.
Keokuk: Cement, 1 mile.
Rock Rapids: Cement, ½ mile.

Kansas—
Arkansas City: Cement, 3 to 4 miles.
Cimarron: Cement, 5 blocks.
Coffeyville: Cement or brick, probably 4 or 5 miles.
Dodge City: Cement, 2 miles.
Fort Scott: Cement, $2,000.
Gates Center: Cement, 2 miles.
Holton: Brick, 22 blocks.
Hutchinson: Cement, 5 miles.
Independence: Cement, 3,000 lin. ft.
Newton: Cement, 100,000 sq. ft.
Pittsburg: Cement or brick, 1 mile.
Salina: Brick, 3,000 lin. ft.; cement, 2,000 lin. ft. (private).
Topeka: Cement, 80,000 sq. ft.
Troy: Cement, 2,000 lin. ft.

Kentucky—
Covington: Cement, 1 mile; 8 to 12 ft. wide.
Danville: Cement, 1 mile.
Hopkinsville: Cement, 1 mile.
Lexington: Cement, 6 miles (public).
Mayfield: Cement, 4,000 lin. ft.

Louisiana—
Mansfield: Cement, 4½ miles.

Massachusetts—
Adams: Cement, 5,000 sq. yds.
Beverly: Brick, 3,000 sq. yds.
Brookline: Cement, 5,000 sq. yds; tar concrete, 6,000 sq. yds; wood, 10,000 lin. ft.
Gloucester: Tar concrete, $2,000.
Lowell: Cement, 1,000 sq. yds; tar concrete, 10,000 sq. yds.
Newburyport: Cement, 2,500 sq. yds.
Revere: Cement, 2,000 sq. yds.
Salem: Brick, 300 sq. yds.; cement, 2,000 sq. yds.; tar concrete, 1,000 sq. yds. (public).
Stoneham: Tar concrete, 5,000 sq. yds.
Westfield: Cement, 500 sq. yds.
Woburn: Cement, 200 lin. ft.; tar concrete, 500 lin. ft.

SIDEWALKS IN CITIES (Continued)

Michigan—
Alpena: Cement, probably 1½ miles.
Benton Harbor: Cement, 4,000 lin. ft. (public).
Cadillac: Cement, 5,856 lin. ft.
Flint: Cement, 16,700 sq. yds.
Marquette: Cement, 1 mile (public).
Port Huron: Cement, 1½ miles.
Saginaw: Cement, 10 miles (public).

Minnesota—
Austin: Cement, 1,100 lin. ft. (public; 9,890 lin. ft. (private).
Duluth: Cement, $10,000; wood, $6,000.
Mankato: Cement, 4,000 lin. ft.

Mississippi—
Hattiesburg: Cement, 1 mile (private).

Missouri—
Carthage: Brick, 3,000 lin. ft.; stone, 4,000 lin. ft.
Columbia: Cement, 4,000 lin. ft. (public).
Sedalia: Cement, 3 miles.
Webb City: Cement, 12,000 sq. ft.

Montana—
Billings: Cement, 25 000 sq. ft.
Bozeman: Cement, 15,000 lin. ft.
Great Falls: Cement, 30,000 sq. ft.
Helena: Cement, 73,000 sq. ft.; wood, 23,000 sq. ft.

Nebraska—
Beatrice: Cement, 12 miles.
Grand Island: Cement, 1 mile.
Lincoln: Cement, 6 miles.
Omaha: Brick, 5,000 lin. ft.; Cement, 100,000 lin. ft.
South Omaha: Brick or cement, about 3 miles.

New Hampshire—
Laconia: Tar concrete, 1,000 lin. ft.

New Jersey—
Bayonne: Cement, 9,530 sq. ft.
Montclair: Cement, 10,000 lin. ft.
Ridgewood: Cement, 2 miles.
Westfield: Cement, 2 miles (public).

New Mexico—
Silver City: Cement, 5,000 lin. ft.

New York—
Corning: Cement, 3,000 lin. ft.
Cortland: Cement, ½ mile.
Elmira: Cement, 20,000 lin. ft. (private).
Hudson: Cement, 2 miles.
New York City, Bronx Boro: Cement, 391,900 sq. ft.; stone, 30,100 sq. ft.
Plattsburg: Cement, 8,000 sq. yds.
Schenectady: Cement, 4 miles.
Utica: Cement, 112,000 sq. ft.

North Carolina—
Charlotte: Cement, 7,500 sq. yds.
Kinston: Cement, 30,000 lin. ft.

North Dakota—
Minot: Cement, 3 miles (public).

Ohio—
Akron: Cement, 375.125 sq. ft.
Cambridge: Cement, 4,000 sq. yds (private).
Chillicothe: Cement, 2,800 sq. ft.
Cincinnati: Cement, 920,000 sq. ft.
Cleveland: Brick, ½ mile; cement, 6.2 miles; stone, 24 miles.
Coshocton: Cement, 5,000 lin. ft. (public).
Dayton: Cement, 30,000 sq. ft. (private; 10,000 sq. ft. (public).
Delaware: Cement, 50,000 sq. ft.
Greenville: Cement, 60,000 sq. ft.
London: Brick, 4 blocks.
Lorain: Stone, 40,000 sq. ft., new; 40,000 sq. ft. relay.
Mansfield: Cement, 1,000 lin. ft.
Marion: Stone, 30,000 sq. ft.
Middletown: Cement, 2 miles.
Norwood: Cement, 27,000 sq. ft.
Painesville: Cement, 6 miles (public).
Warren: Cement, 2 miles; stone, 1 mile.
Troy: Cement, 20,000 sq. ft.
Wooster: Stone, 5,000 sq. ft.

Oklahoma—
Bartlesville: Cement, 1 mile (private).
Durant: Cement, 1 mile (private).
Enid: Cement, 1,000 lin. ft.
Tulsa: Cement, 65,000 sq. ft.

Oregon—
Astoria: Cement, 800 lin. ft.
Eugene: Cement, 28,000 lin. ft.
Medford: Cement, 2,000 lin. ft.
Portland: Cement, 18.1 miles.

Pennsylvania—
Ashley: Stone, 3 300 sq. yds.
Carbondale: Stone, 12,000 lin. ft.
Catasauqua: Cement, 560 sq. yds.
Du Bois: Cement, 1½ miles.
Freeland: Cement, 2 miles.
Juniata: Brick, 3,845 ft.; cement, 3,810 ft.; stone, 5,084 ft.
North Braddock: Cement, ½ mile.
Pittsburgh: Cement, 135,000 sq. ft.

Rhode Island—
Cumberland: Cement, $2,000.
Newport: Cement, 7,000 sq. yds.

South Carolina—
Columbia: Cement, about 6 miles.
Orangeburg: Cement, 5,000 lin. ft.

South Dakota—
Lead: Cement, 7,414 lin. ft.
Sioux Falls: Cement, 3,000 lin. ft.

Tennessee—
Selmer: Cement, 10,000 sq. ft.

Texas—
Ennis: Cement, 5 miles.
Laredo: Cement, 8,000 sq. yds.
Midlothian: Cement, 5,000 lin. ft.
Taylor: Cement, 2 miles.

Utah—
Logan: Cement, $8,000.

Virginia—
Newport News: Cement, about 10.000 sq. yds.
Stanardsville: Cement, 1 mile.

Washington—
Aberdeen: Cement, 10,000 sq. yds.; wood, 1 000 sq. yds.
Bellingham: Cement, 5 miles.
Everett: Cement, 7,500 sq. yds.
Seattle: Cement, 20 miles; wood, 3 miles.
Spokane: Cement, 4 miles.
Walla Walla: Cement, 120,000 sq. ft.

Wisconsin—
Appleton: Cement, 3½ miles.
Fond du Lac: Cement, 3 to 5 miles (private).
Madison: Cement, about 10 miles (private).
Marinette: Cement, 1 mile.
Neenah: Cement, 2 000 lin. ft.
Sheboygan: Cement, 12,000 sq. ft. (public).
Wausau: Cement, 4 miles.

SIDEWALKS IN COUNTY WORK

Arkansas—
Grannis, Polk county: Cement, 5,000 lin. ft.
Monticello, Drew county: Cement, 1 mile.
Paragould, Green county: Cement, 5 miles.

Idaho—
Lewiston, Nez Perce county: Cement, 1½ miles.

Illinois—
Kankakee, Kankakee county: Cement, 364 lin. ft.
Mt. Sterling, Brown county: Cement, 5,000 sq. ft.

Iowa—
Clarion, Wright county: Cement, 35,000 sq. ft.
Emmettsburg, Palo Alto: Cement, 9,000 sq. yds.

Kansas—
Ashland, Clark county: Cement, ½ mile.
Lakin, Kearney county: Cement, 3 miles.
Russell, Russell county: Cement, 1 mile.

Michigan—
Hillsdale, Hillsdale county: Cement, ½ mile.
Rogers, Presque Isle county: 3 miles.

Missouri—
Dixon, Pulaski county: Cement, 12,000 sq. yds.
Exeter, Barry county: Cement, 2 miles; wood, ½ mile.
Linn Creek, Camden county: Cement, ½ mile.
Macon, Macon county: Cement, 3,500 lin. ft.
New Madrid, New Madrid county: Brick, 300 lin. ft.; cement, 1,000 lin. ft.
Potosi, Washington county: Cement, 2,000 lin. ft.

Nebraska—
Kimball, Kimball county: Cement, 500 lin. ft. (private).
Springview, Keyapaha county: Cement, 3,000 lin. ft.

North Carolina—
Mt. Airy, Surry county: Cement, 5 miles.

North Dakota—
Dickinson, Stark county: Cement, 1,000 sq. yds.

Ohio—
Mansfield, Richland county: Cement, 600 sq. yds.

Texas—
Bay City, Matagorda county: Cement, 3 miles.

Virginia—
Rosslyn, Alexandria county: Stone, 3 miles.

CURB AND GUTTER IN CITIES

Arizona—
Flagstaff: Concrete curb and gutter, 24 blocks.

Arkansas—
Hot Springs: Concrete curb, 5,000 lin. ft.; concrete curb and gutter, 15,000 lin. ft.
Pine Bluff: Concrete curb and gutter, 2 miles.

California—
Alhambra: Concrete curb and gutter, 5 miles.
Long Beach: Concrete gutter, 11 miles.
Los Angeles: Cement curb, 85 miles.
Pasadena: Concrete gutter, 55,518 lin. ft.; concrete curb, 58,739 lin. ft.
San Francisco: Brick gutter, 1,000 sq. yds.; cobble gutter, 2,000 sq. yds.; concrete curb and gutter, 70,000 lin, ft.; granite curb, 150,000 lin. ft.
San Jose: Concrete curb and gutter, 25,000 sq. ft.; granite curb and gutter, 1,800 lin. ft.
Santa Barbara: Concrete gutter, 12,000 sq. yds.; concrete curb, 3,700 lin. ft.
Santa Rosa: Concrete curb and gutter, 10,000 lin. ft.

Connecticut—
Torrington: Cobble gutter, 1,000 lin. ft.; concrete curb and gutter, 1 mile; granite curb, ½ mile.
Waterbury: Concrete curb, $6,000.

Colorado—
Canon City: Concrete gutter, 2 miles.

Florida—
Miami: Concrete gutter, 24,000 lin. ft.; concrete curb and gutter, 24,000 lin. ft.

Georgia—
Americus: Concrete curb and gutter, 9,000 lin. ft.
Rome: Concrete curb and gutter, 7,000 lin. ft.

Illinois—
Alton: Concrete curb and gutter, 11 miles; limestone curb, 1,000 lin. ft.
Aurora: Concrete curb and gutter, 10,000 lin. ft.
Berwyn: Concrete curb and gutter, 7,000 lin. ft.
Blue Island: Granite curb, 44,775 lin. ft.
Chicago Heights: 14,136 lin. ft.
Cairo: Concrete curb and gutter, 28,000 lin. ft.
Clinton: Concrete gutter, 6,000 lin. ft.
Decatur: Sandstone curb, 13,500 lin. ft.
Elgin: Concrete curb and gutter, 4½ miles.
Joliet: Concrete curb and gutter, 11,000 lin. ft.; limestone curb, 1,800 lin. ft.
Oak Park: Concrete curb and gutter, 18.58 miles.
Rushville: Concrete curb and gutter, 3 miles.
Waukegan: Concrete curb and gutter, 6,500 lin. ft.

Curb and Gutter in Cities—Continued

Indiana—
Frankfort: Concrete curb, 8,700 lin. ft.; marginal curb, 2,100 lin. ft.
Gary: Concrete curb and gutter, 11 miles; concrete curb, 5 miles.
Hammond: Concrete curb and gutter, 10,000 lin. ft.
Huntington: Concrete gutter, 1 mile.
Richmond: Concrete curb and gutter, 4,500 lin. ft.
Valparaiso: Concrete curb and gutter, 8 miles.
Vincennes: Concrete curb and gutter, 12 miles.

Iowa—
Cedar Falls: Concrete curb and gutter, 22,000 lin. ft.; marginal curb, 5,000 lin. ft.
Cedar Rapids: Concrete curb and gutter, 20,000 lin. ft.
Council Bluffs: Concrete curb and gutter, 15,728 lin. ft.
Iowa City: Concrete curb and gutter, 24,000 lin. ft.
Keokuk: Concrete curb, 11,000 lin. ft.

Kansas—
Arkansas City: Concrete curb and gutter, 6 miles.
Chanute: Concrete curb and gutter, 1 mile.
Fort Scott: Concrete curb, 2 miles.
Hutchinson: Concrete curb and gutter, 5 miles.
Independence: Concrete curb and gutter, 6,000 lin. ft.
Leavenworth: Concrete curb, 6,000 lin. ft.
Ottawa: Concrete curb and gutter, 18,000 lin. ft.; marginal curb, 1,000 lin. ft.
Pittsburg: Concrete curb and gutter, 3¼ miles.
Salina: Concrete curb and gutter, 4 miles.
Topeka: Concrete curb and gutter, 28,000 lin. ft.

Kentucky—
Covington: Concrete curb and gutter, 10,000 lin. ft.
Hopkinsville: Concrete gutter, 1½ miles.
Lexington: Brick gutter, 4 miles; concrete curb 3 miles; concrete curb and gutter, 3 miles; limestone curb, 4 miles.

Massachusetts—
Beverly: Granite curb, 15,000 lin. ft.
Brookline: Granite curb, 3,000 lin. ft.
Lawrence: Granite curb, 20,000 lin. ft.
Lowell: Granite curb, 10,000 lin. ft.
Revere: Granite curb, 1,800 lin. ft.
Salem: Cobble gutter, 1,200 yds.; granite curb, 5,000 lin. ft.
Stoneham: Granite curb, 400 lin. ft.
Woburn: Granite curb, 500 lin. ft.

Michigan—
Ann Arbor: Concrete curb and gutter, 11,000 lin. ft.
Benton Harbor: Concrete curb and gutter, 18,000 lin. ft.
Cadillac: Concrete curb and gutter, 14,341 lin. ft.
Flint: Concrete curb and gutter, 25,010 lin. ft.; sandstone curb, 44,410 lin. ft.; stone header, 9,550 lin. ft.
Manistee: Concrete curb and gutter, 3,466 lin. ft.
Marquette: Marginal curb, 5,000 lin. ft.
Port Huron: Concrete curb, 1 mile.

Minnesota—
Austin: Cement curb, 47,492 lin. ft.
Duluth: Concrete curb, 20,000 lin. ft.; concrete curb and gutter, 12,000 lin. ft.; sandstone curb, 5,000 lin. ft.
Everett: Concrete curb and gutter, $7,000.00.
Mankato: Concrete curb and gutter, 3,000 lin. ft.
St. Cloud: Concrete curb, 20,000 lin. ft.

Mississippi—
Gulfport: Concrete curb and gutter, 30,000 lin. ft.
Hattiesburg: Concrete gutter, ¼ mile.
Meridian: Concrete curb and gutter, 3 miles.

Missouri—
Carthage: Limestone curb and gutter, 1 mile.
Columbia: Concrete curb and gutter, 800 lin. ft.; concrete curb, 3,275 lin. ft.
Sedalia: Concrete curb and gutter, 1 mile.
Webb City: Concrete curb and gutter, 8,000 lin. ft.

Montana—
Billings: Concrete curb, 10,000 lin. ft.
Bozeman: Concrete curb, 8,000 lin. ft.
Great Falls: Concrete curb, 6,000 lin. ft.
Helena: Concrete curb, 15,000 lin. ft.

Nebraska—
Beatrice: Concrete curb and gutter, 10 miles.
Lincoln: Concrete curb and gutter, 50,000 lin. ft.
South Omaha: Concrete curb and gutter, 45,325 lin. ft.

New Hampshire—
Laconia: Granite curb, 1,000 lin. ft.

New Jersey—
Bayonne: Concrete curb and gutter, 1,900 lin. ft.; bluestone curb, 40,450 lin. ft.
Montclair: Concrete curb, 16,000 lin. ft.
Ridgewood: Concrete curb and gutter, 1 mile.
Westfield: Concrete curb and gutter, 1 mile

New Mexico—
Albuquerque: Concrete gutter, 2 miles.
Roswell: Concrete gutter, 9,704 lin. ft.; concrete curb and gutter, 3,000 lin. ft.
Silver City: Concrete curb and gutter, 4,000 lin. ft.

New York—
Cortland: Concrete curb and gutter, ¾ mile.
Hudson: Concrete curb, 1 mile.
Newburgh: Bluestone curb and gutter, 3,600 lin. ft.; 4,500 feet, material not chosen.
New York, Bronx Boro: Bluestone curb, 92,600 lin. ft.
Plattsburg: Concrete curb and gutter, 8,000 lin. ft.
Schenectady: Concrete curb, 1½ mile; granite curb, 6½ miles.
Utica: Concrete curb and gutter, 28,000 lin. ft.
Watertown: Concrete curb and gutter, 1 mile.

North Carolina—
Goldsboro: Granite curb, 2,000 lin. ft.
Kinston: Concrete curb and gutter, 30,000 lin. ft.

North Dakota—
Minot: Concrete curb and gutter, 2 miles; granite curb, 300 lin. ft.

Ohio—
Akron: Concrete curb and gutter, 5,100 lin. ft.; limestone curb, 78,180 lin. ft.
Athens: Concrete curb, 4,796 lin. ft.
Cambridge: Sandstone curb, 8,000 lin. ft.
Chillicothe: Concrete gutter, 2,100 sq. ft.; concrete curb, 2,900 lin. ft.
Coshocton: Concrete curb and gutter, 2,000 lin. ft.
Greenville: Concrete curb and gutter, 3 miles; sandstone curb, 1,000 lin. ft.
Marion: Sandstone curb, 2 miles.
Middletown: Concrete curb and gutter, 2 miles.
Newark: Concrete curb and gutter, 2,180 lin. ft.; marginal curb, 115 lin. ft.
Norwood: Concrete curb and gutter, 13,000 lin. ft.
Painesville: Concrete curb and gutter, 10,822 lin. ft.
Troy: Concrete curb, 4,000 lin. ft.; concrete curb and gutter, 12,000 lin. ft.
Washington: Concrete gutter, 800 lin. ft.
Wooster: Sandstone, 5,410 lin. ft.; marginal curb, 190 lin. ft.

Oklahoma—
Durant: Concrete curb and gutter, 8,800 lin. ft.

Oregon—
Astoria: Concrete curb and gutter, 800 lin ft.
Eugene: Concrete curb and gutter, 21,000 lin. ft.
Portland: Cement curb, 18.1 miles.

Pennsylvania—
Ashley: Cobble gutter, 2,500 sq. yds..
Carbondale: Concrete curb and gutter, 3,247 lin. ft.
Catasauqua: Concrete curb and gutter, 800 lin. ft.
Du Bois: Concrete curb and gutter, 3,000 lin. ft.; marginal curb, 300 lin. ft.
Freeland: Concrete curb and gutter, 2 miles.
Juniata: Concrete curb, 4,490 lin. ft.; sandstone curb, 88.3 lin. ft.
North Braddock: Concrete curb and gutter, 1½ miles.
Oil City: Concrete gutter, 5,500 lin. ft.; concrete curb and gutter, 2,100 lin. ft.
Pittsburgh: Concrete curb, 30,000 lin. ft.

Rhode Island—
Newport: Granite curb, 7,100 lin. ft.

South Carolina—
Orangeburg: Granite curb, 7,500 lin. ft.; marginal curb, 500 lin. ft.

South Dakota—
Lead: Concrete curb, 2,810 lin. ft.
Sioux Falls: Concrete curb and gutter, 2,100 lin. ft.

Tennessee—
Jackson: Concrete curb, 6,720 lin. ft.
Johnson City: Concrete curb and gutter, 2 miles.

Texas—
Corsicana: Concrete curb and gutter, 4 miles.
Ennis: Concrete curb and gutter, 3 miles.
Lufkin: Concrete curb and gutter, 1,500 lin. ft.
Taylor: Concrete curb and gutter, 7 miles.

Utah—
Logan: Concrete curb and gutter, $3,500.

Washington—
Aberdeen: Concrete curb and gutter, 25,000 lin. ft.
Bellingham: Concrete gutter, 2 miles.
Everett: Concrete curb and gutter, 6,500 lin. ft.
Seattle: Brick gutter, 10 miles; concrete curb, 12 miles.
Spokane: Concrete curb and gutter, 5 miles.
Walla Walla: Concrete curb, 10,000 lin. ft.

Wisconsin—
Appleton: Concrete curb and gutter, 4 miles.
Beloit: Concrete curb and gutter, 90,000 lin. ft.
Fond du Lac: Concrete curb and gutter, 6 miles.
La Crosse: Concrete curb and gutter, 16,500 lin. ft.
Madison: Concrete curb and gutter, 6 miles.
Neenah: Concrete curb and gutter, 5,800 lin. ft.
Sheboygan: Brick gutter, 650 sq. yds.; concrete curb and gutter, 39,000 lin. ft.
Watertown: Concrete curb and gutter, 3,735 lin. ft.
Wausau: Concrete curb and gutter, 1 mile.

CURB AND GUTTER IN COUNTY WORK

Arkansas—
Paragould, Green county: Concrete gutter, 6 miles; concrete curb, 6 miles.

Idaho—
Lewiston, Nez Perce county: Concrete curb and gutter, 1½ miles.

Illinois—
Monmouth, Warren county: Concrete curb, 6,000 lin. ft.
Peoria, Peoria county: 1,800 lin. ft. marginal curb.

Indiana—
Martinsville, Morgan county: Concrete gutter, 60 rods.

Iowa—
Emmettsburg, Palo Alto county: Concrete gutter, 8,000 lin. ft.
Estherville, Emmett county: Concrete curb, 2 500 lin. ft.
Forest City, Winnebago county: Concrete gutter, 1 mile.

Kansas—
Dodge City, Ford county: Concrete gutter, 1 mile.
Newton, Harvey county: Concrete curb and gutter, 5 miles.

Kentucky—
Lockwood, Boyd county: Concrete gutter, 1.7 miles.

Michigan—
Hillsdale, Hillsdale county: Concrete curb and gutter, ½ mile.

Missouri—
Dixon, Pulaski county: Concrete gutter, 1,000 lin. ft.
Exeter, Barry county: Concrete gutter, 3 miles.

Curb and Gutter in County Work—Continued

Potosi, Washington county: Concrete gutter, 2,000 ft.; curb, 2,000 ft.

New York—

Canandaigua, Ontario county: Cobble gutter, 5 miles; concrete curb and gutter, 3 miles.

Herkimer, Herkimer county: Concrete curb and gutter, 5 miles.

Malone, Franklin county: Cobble gutter, 3,000 lin. ft.

Penn Yan, Yates county: Concrete curb and gutter, 1 mile.

Waterloo, Seneca county: Granite curb, 1 mile.

North Carolina—

Mt. Airy, Surry county: Concrete gutter, 1 mile; granite curb, 1 mile.

North Dakota—

Dickinson, Stark county: Concrete curb and gutter, 1,200 lin. ft.

Ohio—

Painesville, Lake county: Concrete gutter, 13 miles.

St. Clairsville, Belmont county: Concrete curb, 23 miles.

Wisconsin—

Green Bay: Concrete gutter, 6,000 lin. ft.

Madison, Dane county: Concrete curb and gutter, 13,000 lin. ft.

Milwaukee, Milwaukee county: Concrete curb and gutter, 16,000 lin. ft.

SEWER CONSTRUCTION—1915

Alabama—

Anniston: Vitrified pipe, 2 miles.

Arizona—

Pine Bluff: Vitrified pipe, 6,000 ft., 12 in. to 27 in.

Arkansas—

Hot Springs: Vitrified pipe, 8,000 ft.; manholes, 60.

McGehee: $30,000.

California—

Alhambra: Brick, 24 to 30 in.; vitrified pipe, 10 to 14 in.

Long Beach: Concrete pipe, 7 miles; vitrified pipe, 30 miles; manholes, 400.

Los Angeles: 120 miles sanitary sewer; 75 miles storm sewer.

Pasadena: Vitrified pipe, 7,020 ft.; manholes, 18; catch basins, 5.

San Bernardino: Vitrified pipe, 7,000 ft. 8-in.; manholes, 20.

San Francisco: Vitrified pipe, 10,200 ft., 10-in.; manholes, 500; catch basins, 350.

San Jose: Vitrified pipe, 2,500 ft. 6-in.; manholes, 75; catch basins, 500.

Santa Barbara: Vitrified pipe, 5 miles, 6 to 12-in.

Santa Rosa: Vitrified pipe, 3 miles, 8 to 12-in.; manholes, 20.

Colorado—

Denver, $7,650.

Connecticut—

Danbury: $20,000.

Meriden: Will spend $7,500; city labor.

Rockville: Vitrified pipe, 2,000 ft.; manholes, 20; catch basins, 40.

Torrington: Vitrified block, 3,700 ft.; vitrified pipe, 6,000 ft.; manholes, 20; catch basins, 20.

Waterbury: $15,000 vitrified pipe, 8 to 12-in; $12,000 storm sewer.

Delaware—

Wilmington: Concrete pipe, 8,000 ft., 30 and 36-in.; vitrified pipe, 2,000 ft., 24-in.

Florida—

Clearwater: Sanitary sewers, $18,000; storm sewer, $4,900.

Miami: Vitrified pipe, 20 miles, 8 to 24-in.; manholes, 200; catch basins, 75.

Pensacola: Vitrified pipe, 7,900 ft., 8-in. to 36-in.

Georgia—

Americus: Vitrified pipe, 1 mile, 18-in.; manholes, 10; catch basins, 28.

La Grange: Vitrified pipe, 2½ miles, 4 to 15-in.; manholes, 12; catch basins, 8.

Rome: Vitrified pipe, 2,200 ft., 12 to 24-in. storm.

Idaho—

Moscow: $11,000.00.

Illinois—

Alton: $150,000 system, 9-ft. to 8-in., concrete and vitrified pipe.

Aurora: Vitrified pipe, 3 miles.

Berwyn: Vitrified pipe, 35,000 ft.

Cairo: Vitrified pipe, 7,500 ft., 6 to 12-in.; manholes, 20; catch basins, 50.

Chicago Heights: Vitrified pipe, 7,700 ft., 12 to 24-in.; manholes, 22; catch basins, 55.

Cicero: Vitrified pipe, 2,000 ft., 12-in., 2,000 ft. 15-in.; manholes, 20; catch basins, 30.

Crete: Vitrified pipe, 34,258 ft. 6 to 20-in.; cast iron pipe, 105 ft.; manholes ,208.

Decatur: Vitrified pipe, 7,000 ft., 10 and 18-in.; manholes, 45; catch basins, 75.

Joliet: Vitrified pipe, 43,000 ft., 6 to 36-in.; manholes, 150; catch basins, 300.

Oak Park: Brick, 100 ft.; vitrified pipe, several miles 12-in. to 18-in.; manholes every 100 ft., and 60 to 80 catch basins.

Wenona: $26,000.

Indiana—

Attica: Vitrified pipe, 1,850 ft., 12 and 15-in., 15,000 ft. 8 and 10-in.

Frankfort: Vitrified pipe, 3,800 ft., 10 and 12-in.; manholes, 15; catch basins, 30.

Garrett: $3,000.

Gary: Concrete, 1,000 ft., 36-in.; vitrified pipe, 15,000 ft.; manholes, 90; catch basins, 25; outlets, 25.

Hammond: $700,000.00 system.

Indianapolis: $9,652.

Logansport: Vitrified pipe, 1,850 ft.; manholes, 10.

Richmond: Vitrified pipe, 5,000 ft.

Iowa—

Burlington: 15,600 ft. of concrete and vitrified pipe.

Cedar Falls: Vitrified pipe, 2,000 ft.

Cedar Rapids: Brick, 1,680 ft., 36-in.; vitrified pipe, 7,600 ft., 6 to 18-in.; manholes, 28; catch basins, 8; flush tanks, 3.

Council Bluffs: Vitrified pipe, 32,795 ft.

Forest City: 3,000 ft. storm.

Grinnell: Sanitary sewer, 69,000 ft. 8 to 24-in.

Leon: Vitrified pipe, 9 miles.

Mason City: Vitrified pipe, 23,000 ft., 8 to 15-in.

State Center: 24,200 ft., 8 and 10-in.

Kansas—

Arkansas City: ¾ mile storm.

Hutchinson: Reinforced concrete, 75,000 ft. 30-in.; vitrified pipe, 5 miles.

Independence: Brick, 2,000 ft.; reinforced concrete, 1,500 ft.; vitrified pipe, 3,000 ft.

Leavenworth: Vitrified, 5,000 ft. 8-in.; manholes, 6.

Ottawa: Vitrified pipe, 1,300 ft., 8 in.

Pittsburg: Vitrified pipe, 1,300 ft., 8-in.

Salina: 2,500 ft. of 36-in. sewers. Kind undecided. Vitrified pipe, 7,000 ft.

Topeka: Reinforced concrete, 2,800 ft. 6 by 9; vitrified block, 2,600 ft., 33 to 45-in., 4,000 ft. 8 to 24-in.; manholes, 24; catch basins, 142.

Kentucky—

Covington: 3,900 ft. of 4-ft. sewer. Kind not decided.

Lexington: Vitrified pipe, 62,000 ft. 8 and 15-in.; manholes, 40; catch basins, 14.

Maryland—

Baltimore: $266,000.00.

Massachusetts—

Adams: Vitrified pipe, 3,600 ft., 8 to 24-in.; manholes, 12; catch basins, 15.

Brookline: Concrete, 1,600 ft., 60-in.; vitrified pipe, 2 miles.

Gloucester: Vitrified pipe, 1,000 ft.

Lawrence: Vitrified pipe, 17,500 ft.; manholes, 65.

Lowell: Brick, 1,250 ft. 30-in., 85 ft. 72-in.; vitrified pipe, 1 mile; manholes, 50; catch basins, 50; outlets, 2.

Newburyport: Vitrified pipe, 1,700 ft.; catch basins, 20.

Orange: $600.00.

Revere: Vitrified pipe, 10,800 ft., 8 to 18-in.

Salem: Vitrified pipe, 1 mile.

Stoneham: Vitrified pipe, 5,000 ft.; manholes, 25; catch basins, 4.

Westfield: Vitrified pipe, 10,000 ft.

Michigan—

Benton Harbor: Vitrified pipe, 5,500 ft. 10-in.

Cadillac: Vitrified pipe, 3,400 ft.; manholes, 14.

Flint: Concrete pipe, 10,560 ft., 18 to 24-in.; vitrified block, 8,180 ft., 27 to 42-in.; vitrified pipe, 44,600 ft., 6 to 22-in.; manholes, 242; catch basins, 200.

Grand Rapids: $4,000.00.

Marquette: None.

Saginaw: Concrete pipe, 3 or 4 miles.

Minnesota—

Austin: Vitrified pipe, 5,550 ft.; manholes, 26.

Duluth: Vitrified pipe, $100,000.00.

Eveleth: $26,000 for 24-in. storm sewer.

Mankato: Vitrified pipe, 1,300 ft.; manholes, 4.

St. Cloud: Vitrified pipe, 5,295 ft., 8 to 15-in.

Wadena: Brick, 3,700 ft.; tile, 1,575 ft. 30-in., 3,800 ft. 12-in.

Mississippi—

Gulfport: Vitrified pipe, 2,000 ft. 10-in.

Hattiesburg: Vitrified pipe, ½ mile 8-in.; manholes, 6.

Meridian: Reinforced concrete, 1,000 ft.; vitrified pipe, 3 miles.

Okolona: $58,000.

Missouri—

Carthage: Vitrified pipe, 1½ miles.

Sedalia: Vitrified pipe, 2 miles, 8 to 15-in.; manholes, 10.

Webb City: Concrete, 500 ft.; vitrified pipe, 1,800 ft. 8-in.; manholes, 4.

Montana—

Billings: Vitrified pipe, 5,000 ft.

Bozeman: Vitrified pipe, 2,500 ft. 6-in.; manholes, 8.

Butte: 13 miles, 8 to 12-in.

Great Falls: Vitrified pipe, 1,530 ft., 6 to 12-in.; manhole, 1; catch basins, 3; outlets, 12.

Helena: Vitrified pipe, 4 miles, 8 to 10-in.; manholes, 25; catch basins, 5.

Nebraska—

Grand Island: Vitrified pipe, possibly 3 miles.

Lincoln: Vitrified pipe, 3 miles, 8 in.; manholes, 30.

Omaha: Probably spend nearly $200,000.00 in sewers.

South Omaha: Vitrified pipe, 5,340 ft., 8 and 10-in.; Manholes, 190 vertical ft.

New Jersey—

Bayonne: Vitrified pipe, ¾ mile; manholes every 120 ft.

Camden: Brick, about 2 miles.

Dover: None.

Montclair: Vitrified pipe, 3 miles, 8-in. to 10-in.

North Wildwood: $32,000.

Oaklyn: Sanitary sewer system.

Princeton: Vitrified pipe, 3,500 ft.

Ridgewood: Vitrified pipe, 6,300 ft., 12 to 24-in.; manholes, 31; catch basins, 56.

Westfield: Vitrified pipe, 4,000 ft., 27 and 30-in., 2,000 ft. 8-in.

New York—

Corning: Vitrified pipe, 3,505 ft.; manholes, 11; catch basins, 2.

Cortland: Vitrified pipe, ½ mile.

Ebenezer: $25,380.

Elmira: Vitrified pipe, 8,000 ft.; manholes, 25.

Dunkirk: Intercepting sewer.

Gloversville: Vitrified pipe, 550 ft. 20-in., 3,260 ft. 18-in., 580 ft. 15-in., 1,045 ft. 12-in.; manholes, 19; catch basins, 45.

Mount Morris: Sewer system.

Newburgh: Vitrified pipe, 1,275 ft.

New York, Manhattan Boro: Brick, 13,736 ft., 2-ft. 9-in. to 9-ft. 6-in.; concrete, 8,050 ft. 5-ft. to 10-ft.; wooden, 1,772 ft., 3-ft. to 5-ft.; cast iron pipe, 326 ft., 12-in. to 24-in.; vitrified pipe, 19,760 ft., 8-in. to 30-in.; manholes, 363; catch basins, 58; outlets, 2.

New York, Bronx Boro: Concrete, 8,900 ft.; reinforced concrete, 31,500 ft.; vitrified pipe, 13,700 ft.! manholes, 400; catch basins, 38.

Oswego: $50,000.00.

Plattsburg: Vitrified pipe, 2,000 ft.

Ravenna: Vitrified pipe, 5 miles, 8 to 12-in.

Schenectady: Vitrified pipe, 5 miles; manholes, 80; catch basins, 50.

Utica: Vitrified pipe, 1.6 miles, 8 to 20-in.; manholes, 9.

Yonkers: $13,000.00.

North Carolina—

Charlotte: 2 miles of 30 to 60-in. trunk sewer.

Sewer Construction—Continued

Durham: Vitrified pipe, 1,800 ft. 8-in., 6,200 ft. 12-in.; manholes, 16.
Goldsboro: Vitrified pipe, 2,000 ft.; manholes; catch basins.
Kinston: 8 miles of 8 to 18-in. sewer.
Southport: $43,000.

North Dakota—
Minot: Vitrified pipe, 1,548 ft., 10 to 15-in. vitrified block, 2,000 ft. 30-in.; manholes, 50; catch basins, 20.

Ohio—
Akron: $20,000 to $30,000 storm sewer.
Cambridge: Vitrified pipe, 5,394 ft.
Chillicothe: Reinforced concrete, 3,280 ft, 7 by 10; vitrified pipe, 1,200 ft.; manholes, 6; catch basins, 22.
Cincinnati: Brick or concrete, 14,375 ft., 30 to 120-in.; brick, concrete or block, 8,590 ft., 30 to 57 in.; reinforced concrete, 16,000 ft., 90 to 120-in.; vitrified pipe, 74,200 ft., 12 to 27-in.; manholes, 532.
Cleveland: Brick: 9 miles; concrete, plain, 3,250 ft. 12-ft., 3,300 ft. 8-ft.; vitrified pipe, 6 miles; manholes, 150; catch basins, 300.
Dayton: Vitrified pipe, 90,000 ft., 5-in. to 24-in.; concrete, 5,355 ft., 30 to 60-in.; manholes, 68; catch basins, 12; inlets, 126.
Delaware: Vitrified pipe, 3,000 ft. 8-in.; manholes, 10; catch basins, 4.
Greenville: Vitrified pipe, 600 ft. 12-in.
Kent: $90,000.00.
Lancaster: Vitrified pipe, 8,968 ft., 6-in. to 24-in.
Lorain: Vitrified pipe, 2 miles.
Mansfield: Vitrified pipe, 420 ft. 8-in.; manholes, 2.
Marion: Vitrified block, 7,000 ft.; vitrified pipe, 10,000 ft.; manholes, 30.; catch basins, 40.
Newark: Vitrified pipe, 4,500 ft.; manholes, 16; catch basins, 41.
Newcomerstown: $55 000.
Norwood: Vitrified block, 800 ft. 60-in., 200 ft. 48-in.
Painesville: Vitrified block, 550 ft. 36-in., 725 ft. 42-in.; vitrified pipe, 3,700 ft., 10 to 24-in.; manholes, 16; catch basins, 28.
Portsmouth: Cement, 1,500 ft.
Salem: $10,000.00.
Troy: Vitrified pipe, 10,560 ft., 10 to 24-in.; manholes, 10; inlets, 90.
Warren: Vitrified pipe, 3,000 ft. 24-in.; manholes, 50; catch basins 100.
Washington, C. H.: Vitrified pipe, 1 mile.
Wooster: Vitrified pipe, 3,155 ft. 10-in.; manholes, 12.

Oregon—
Astoria: Vitrified pipe, 4,884 ft., 24 and 30-in.; manholes, 23; catch basins, 31; outlets, 8.
Eugene: Concrete pipe, 8,000 ft., 8-in. and 10-in.
Portland: Reinforced concrete, 1,940 ft., 33 to 84-in.; concrete pipe, 17,576 ft., 30 to 60-in.; vitrified pipe, 60,000 ft., 8 to 24-in.; manholes, 250; catch basins, 300.

Oklahoma—
Enid: Vitrified pipe, 3,000 ft.
Tulsa: Concrete pipe, 8,000 ft. 8-in., 2,000 ft. 10-in.; 50 manholes; 100 catch basins.

Pennsylvania—
Allentown: Reinforced concrete, 2,652 ft., 8x7 to 2x2½ ft.; vitrified pipe, 380 ft., 15-in.; catch basins, 16.
Bradford: Vitrified pipe, 800 ft., 10 and 12-in.; catch basins, 8; outlets, 2.
Carbondale: Vitrified pipe, 43,721 ft., 6 to 15-in.; manholes, 174.
Carlisle: Vitrified pipe, 1,500 ft. 8-in.
Catasauqua: Concrete, 375 ft.
Du Bois: Vitrified pipe, ¾ miles, 12-in., 3,000 ft. 8-in.; manholes, 10.
Erie: Vitrified pipe, 13,000 ft.; manholes, 40.
Homestead: Vitrified pipe, 2,200 ft. 12-in.; manholes, 9.
Juniata: Concrete pipe, 1,600 ft.; manholes, 6.
Nanticoke: Vitrified pipe, 3 miles, 8 to 20-in.
North Braddock: Vitrified pipe, ½ mile 8-in., 600 ft. 36-in.; manholes, 10 catch basins, 10.
Oil City: Vitrified pipe, 8,500 ft., 6 to 12-in.
Philadelphia: $200,000.
Pittsburgh: Brick, 2,080 ft., 36 to 60-in.; concrete, plain, 7,570 ft.; concrete, reinforced, 200 ft.; vitrified pipe, 39,750 ft., 6 to 36-in.; manholes, 186; catch basins, 150; outlets, 3.
Williamsport: Vitrified block, 1,351 ft.; vitrified pipe, 3,478 ft.; manholes, 13; catch basins, 2.

Rhode Island—
Newport: Vitrified pipe, 2,550 ft.

South Carolina—
Anderson: Terra cotta, 50,000 ft. 8-in.
Columbia: Reinforced concrete, 1,400 ft. 36-in.; vitrified pipe, 2,500 ft.
Orangeburg: Vitrified pipe, 8,100 ft., 8 to 12-in.; manholes, 20; catch basins, 20.

South Dakota—
Lead: Vitrified pipe, 3,160 ft., 6 to 12-in.
Mitchell: $12,611, sanitary.
Sioux Falls: Vitrified pipe, 5,000 ft.

Tennessee—
Jackson: Vitrified pipe, 150 ft. 8-in.; steel pipe, 1,600 ft. 16-in.
Lafayette: Sewer system, $17,500.

Texas—
Laredo: Vitrified pipe, 3,600 ft. 30-in.; manholes 3; catch basins ,24; outlet, 1.
San Antonio: 1,300 ft. 60-in. sanitary sewer.
San Benito: $5,000.

Utah—
Logan: Vitrified pipe, $10,000.00.

Virginia—
Danville: Vitrified pipe, 6,000 ft. 8-in.
Newport News: Vitrified pipe, 710 ft. 18-in., 3,300 ft. 15-in., 1,320 ft. 12-in., 4,000 ft. 8-in.; 30 manholes; catch basins.

Washington—
Aberdeen: Reinforced concrete, 3,200 ft. 36-in.; vitrified pipe, 65,100 ft., 8 to 24-in.; manholes, 225; catch basins, 50.
Everett: Concrete pipe, 5,000 ft.
Bellingham: Vitrified pipe, 2 miles, 8 to 24-in.
Seattle: Vitrified pipe, 20 miles; manholes, 350; catch basins, 650.
Spokane: Reinforced concrete, 850 ft. of 5-ft. 6-in.; vitrified pipe, 2 miles of 12-in.
Walla Walla: Vitrified pipe, 10,000 ft.

West Virginia—
Huntington: 2,800 ft. of 10 and 12-in. laterals.
Parkersburg: Vitrified pipe, $50,000.00.

Wisconsin—
Appleton: Vitrified pipe, 4,500 ft.
Beloit: Vitrified pipe, 5,000 ft. 8-in.; manholes, 12.
Fond du Lac: Vitrified pipe, 2 miles, 8 to 15-in.
Kenosha: $102,000.
La Crosse: Vitrified pipe, 2,500 ft. 12-in.
Madison: Cast iron, 10,000 ft. 18 to 24-in.; vitrified pipe, 5 miles, 6 to 20-in.; manholes, 100.
Manitowoc: $18,300.
Milwaukee: $212,000 intercepting sewer.
Neenah: Vitrified pipe, 2,500 ft.; manholes, 5; catch basins, 12; outlets, 2.
Sheboygan: Vitrified pipe, 12,000 ftt.; manholes, 60; Catch basins, 100.
Watertown: Vitrified pipe, 6,000 ft.; 8-in. to 18-in.; manholes, 11; catch casins, 49.
Wausau: Vitrified block, 4,650 ft., 30-in. to 4 ft. 8 in.; pipe, 7,960 ft., 12 to 24-in.; manholes, 30; catch basins, 60

DRAINS FOR COUNTY ROADS

Alabama—
Hamilton, Marion county: 2,000 to 6,000 ft. vitrified pipe.
Talladega, Talladega county: 600 ft. 15 and 18-in. vitrified pipe.

Arkansas—
Malvern, Hot Springs county: 500 ft. 20-in. concrete pipe.
Paragould, Green county: Tile drains.

California—
Los Angeles, Los Angeles county: 40,000 ft. reinforced concrete pipe. Start on $15,000,000.00 storm drain system.
San Diego, San Diego county: 2,000 ft. 4-ft. reinforced concrete.

Illinois—
Rushville, Schuyler county: 1,000 ft. reinforced concrete.
Springfield, Sangamon county: 3 miles, tile.

Indiana—
Martinsville, Morgan county: 6 miles dredge.
Plymouth, Marshall county: 10 miles tile. 20 miles dredge. 5 miles open ditch work.

Iowa—
Algona, Kossuth county: 5-in. to 36-in. concrete pipe. 5-in. to 36-in. vitrified pipe.
Fort Dodge, Webster county: Will install 60,000 ft. small drain tile, and $144,000 county drains will be let in April and May.
Estherville, Emmett county: 10 miles open ditch. 2 miles 30-in. tile. 5 miles 20 to 30-in. tile. 15 miles tile under 20-in.
Forest City, Winnebago county: Large amount of 6 to 36-in. vitrified pipe.
Hampton, Franklin county: 70 miles 6 to 42-in. vitrified tile.
Knoxville, Marion county: 6 miles new channel for river.
Manchester, Delaware county: 1,300 rods 6-in. tile.

Kansas—
Iola, Allen county: 8 or 9 miles vitrified pipe.

Kentucky—
Bedford, Trimble county: 12 to 60-in. drains.
Danville, Boyle county: 6 reinforced concrete, various sizes. 200 ft. vitrified pipe.

Maryland—
Centreville, Queen Anne county: Corrugated iron pipe.

Michigan—
Corunna, Shiawassee county: 1,000 ft. 12-in., 500 ft. 18-in., 200 ft. 24-in. concrete pipe.
Hillsdale, Hillsdale county: 25 miles, 8 to 24-in. vitrified pipe.

Minnesota—
Albert Lea, Freeborn county: 050,000 county ditches.
Fairmont, Martin county: $200,000 tile drainage.
Le Sueur Center, Le Sueur county: 6 ditches, estimated total cost, $27,400.
Wheaton, Traverse county: 70 miles ditches.

Missouri—
Brays, Miller county: 15 reinforced concrete drains, from 3 by 3 ft. to 6 by 12 ft. and from 16 to 20 ft. long.
Dixon, Pulaski county: 2 14-ft. reinforced concrete, 25 plain concrete.
Exeter, Barry county: 60 reinforced concrete culverts. 90 10 by 12-in. concrete pipe.
Fulton, Callaway county: 4,000 ft. vitrified pipe.
Jackson, Cape Girardeau county: 20 reinforced concrete culverts. 500 ft. vitrified pipe.
Jefferson City, Cole county: 60 ft. 4 by 10-ft. reinforced concrete. 100 ft. 30 to 48-in. concrete pipe. 340 ft. 12 to 24-in. vitrified pipe.
Ironton, Iron county: 25 corrugated iron drains 12 to 24 in.
Luray, Clark county:: concrete culverts.
Macon, Macon county: 30 2-ft. to 8-ft. by 18-ft.
Warrenton, Warren county: 20 plain concrete up to 24 in. 18 reinforced concrete up to 12 ft. 24 vitrified pipe up to 24 in.

New Jersey—
Newton, Sussex county: 5,000 ft. 4 and 6-in. vitrified pipe.

New Mexico—
Raton, Colfax county: 15 concrete pipe drains, 3 to 4 ft. opening by 18 ft. long.

New York—
Fonda, Montgomery county: 500 ft. vitrified pipe.
Ithaca, Tompkins county: 60 plain concrete, 2 to 5 ft. 200 concrete pipe, 12 to 18 in.
Malone, Franklin county: 5,000 ft. vitrified pipe.

Ohio—
Troy, Miami county: 25 to 30 miles, 6 to 30-in. drain tile.
Zanesville, Muskingum county: 1,200 ft. vitrified pipe.

Texas—
Angleton, Brazoria county: 200 miles open ditches.
Bay City, Matagorda county: 20 miles main ditches. 10 miles laterals.
Dallas, Dallas county: 500 reinforced concrete, 2,000 ft. steel pipe.
Hillsboro, Hill county: 250 corrugated iron pipe culverts, 24 to 48 in.

Wisconsin—
Rhinelander, Oneida county: 30 plain concrete culverts.
Superior, Douglas county: 75 plain concrete culverts.

SEWAGE DISPOSAL PLANTS

California—
Long Beach: Settling tank, 1.
Alhambra, Pasadena and So. Pasadena are planning a complete disposal plant for the three cities.

Connecticut—
Danbury: 1 new filtration bed, $2,000.

Illinois—
Aurora: Settling tank, 1.
Crete: Contact beds and Imhoff tank.
Pana: Settling tank, 1.
Septic tank, 1.

Indiana—
Brazil: Probably a new plant.
Indianapolis: Plans for $2,000,000.00 plant being made.
Richmond: Small settling tank, 2 5-in. siphons.

Iowa—
Grinnell: Sewage disposal plant.

Kansas—
Chanute: Septic tank, $20,000.00.
Fort Scott: Septic tank, $25,000.00.
Hutchinson: Pumping station.

Kentucky—
Lexington: Vote on bond issue in November.

Michigan—
Manistee: Settling tank, $700.00.

Minnesota—
Duluth: Pumping set, $4,700.00.

Mississippi—
Hattiesburg: Septic tanks, 2.

Missouri—
Sedalia: Imhoff tank, contemplated.
One septic tank with 4 contact beds.
Springfield: Disposal plant for northwestern part of city contemplated.

Montana—
Bozeman: Experimental tank on small scale.

New Jersey—
Montclair: Joint disposal works (Imhoff type) for Orange, East Orange and Montclair.
Oaklyn: Sewage disposal plant.
Ridgewood: Possibly Imhoff.
Westfield: 4-acre sand filter.

New York—
Ravena: Settling tank, sludge bed, screen well and house.

North Carolina—
Charlotte: Proposed plant for 30,000 population, type not determined.

North Dakota—
Minot: Septic tank, 1.
Pump, 1.

Ohio—
Coshocton: Settling tanks, 2.
Dayton: $30,000 bonds sold to carry on work and plans for sewer system and disposal plant.
Grandville: Disposal plant to be built.
Mansfield: Plans being made for plant.

Pennsylvania—
Beaver: $40,000.00 plant. Plans approved.
DuBois: Plans being made for plant.
Tyrone: Site purchased.
York: Sewage disposal works.

Texas—
Corsicana: Kind undecided.
Ennis: Settling tank, 1.
Filters, 2.
Septic tank, 1.

Wisconsin—
Sheboygan: Pump, 1.

WATER WORKS IMPROVEMENTS

Alabama—
Bessemer: City figuring on purchasing water works.

Arkansas—
Fort Smith: Distribution mains, 7 miles 6 and 8-in., c. i.

California—
Pomona: Acquisition of private plant being considered.
San Bernardino: Mains, 4,500 ft. 20-in. steel.
Santa Barbara: Mains, 2 miles 4 and 8-in. c. i.
Santa Rosa: Meters, 65.

Connecticut—
Bristol: Supply mains, 1,200 ft. 12-in.
Danbury: 2 miles 6-in. c. i.
Waterbury: Reservoirs, 2 concrete storage tanks. cap. 1,000,000 gal. each. Mains, $5,000.00 c. i.

Georgia—
Americus: Pumps, 1 10-in. centrifugal, 1 1,000-ft. air compressor. Mains, 3,000 ft. 6-in. c. i.
Valdosta: Mains, 500 ft. 8-in. c. i.

Illinois—
Alton: Mains, 7,500 ft. 6-in. 15 new water plugs.
Aurora: Mains, 10,000 ft. 4 and 6-in. c. i.
Berwyn: Mains, 50,000 ft. c. i.
East Peoria: Pumping station and standpipe, $10,300.
Elgin: Mains, 1,700 ft. 4 to 8-in. c. i.
Elmhurst: Deep well.
Joliet: Reservoir, 5,500,000 gal. Mains, 29,000 ft. 6, 8 and 10-in. c. i.
Litchfield: Boilers, 2. Buildings, 1. Filter plant, 1. Intake, 1.

Indiana—
Anderson: Pump, 8,000,000 gal.
Garrett: New engine and accessories, $5,500.
Gary: Extension, 11 miles 6 to 20-in. pipe. 54 hydrants. Cost $112,000.00. Private co.
Logansport: Mains, 2,000 ft. 6 to 12-in. c. i.
Madison: 5 deep wells.
Peru: One elec. centrifugal pump. Mains, 7,000 ft. of 6 and 8-in. c. i.

Iowa—
Cedar Rapids: Pump, 6,000,000 gal. Well, 1 artesian.

Kansas—
Arkansas City: Completing $97,000 improvements.
Burrton: $25,000 bond issue passed for installing system.
Fort Scott: Filter plant, $32,000.
Independence: Mains, 500 ft. Meters, 600.
Topeka: Reservoir contemplated. Mains 3 miles c. i.

Kentucky—
Covington: Mains, 4½ miles 24-in. c. i.
Hodgenville: $14,300.

Maryland—
East New Market: Water works system.
Kensington: Water works system, $22,239.

Massachusetts—
Beverly: Mains, 10,000 ft. c. i.
Brookline: Settling basin, filter plant, wells, reservoir, $200,000.
Fitchburg: $99,105.
Gloucester: Mains, 3,000 ft. 12-in.
Lowell: Pumps, 2—7,500,000 gal. Building, 1 for pump. Setling basins, 2. Filter plants, 6. Wells, 200. Reservoir, 1. Mains, 5,000 ft. 8 and 12-in. c. i
Revere: Pump, 1 Mains, 8,000 ft. 6, 8 and 10-in c. i. 1 auto truck.
Salem: Pumps, 2 10,000-gal. Reservoir, 10,000,000 gal. Mains, 14 miles 6 to 20-in. c. i. and 5 miles 36-in. c. i.
Stoneham: Mains, 1,500 ft. c. i.
Westfield: Reservoir, 200,000,000 gal. recommended. Mains, 2 miles 8-in. c. i.
Woburn: Mains, $15,000 to $25,000.

Michigan—
Albion: Going to bond for $20,000 for auxiliary plant.
Benton Harbor: Boiler, 1. Wells. 3 new, 150 ft. deep. Mains, 35,300 ft. 6 to 12-in. c. i.
Marion: Standpipe and system of water pipes. 80-ft. water tower. Mains, 5,000 ft 4 and 6-in.
Marquette: Mains, 900 ft. 4-in. c. i.
Saginaw: Bond issue, $750,000 to be voted.
Schoolcraft: $22,000 system.

Minnesota—
Austin: Office building.
Winona: 4 artesian wells. 490 ft. deep.

Missouri—
Carthage: Well, 1. Mains, ¼ mile steel.
Columbia: Reservoir, 3,000,000 gal. concrete. Mains, about 1 mile.
Kansas City: Steam turbine, centrifugal pump of 20,000,000 gal. cap.
Sedalia: Filter plant, $60,000.
St. Louis: Engine and centrifugal pump, $42,000.

Montana—
Billings: Pump and motor, $1,950.00. Buildings, 2. Settling basin, 1. Filter plant, 1. Mains, 6 miles.
Bozeman: Mains, 2,500 ft. 6-in. c. i.

Nebraska—
Grand Island: Wells, 2, 1,000 gal. per minute.
Lincoln: Boiler, 1 500-h.p. Mains, 4 miles 4 to 8-in.
Omaha: Improvements, $6,000.

New Jersey—
Bayonne: Mains, 1 mile, 8-in. c. i.
Camden: Pumps, 5,000,000 gal.
House for pumps.

New York—
Barker: Standpipe, filter, reservoir and 4½ miles mains.
Cortland: Mains, ½ mile 8-in. c. i.
Dunkirk: Mains, 2,000 ft. 6-in. c. i.
Hudson: Mains, 1,000 ft. 6-in. c. i.
Plattsburg: Mains, 4,000 ft. 16-in. c. i.; 2,000 ft. 6 and 8-in. c. i.
Schenectady: Pumps, $30,000.00. Buildings, $3,000.00. Reservoir, $250,000.00. 10,000,000 gal. Mains, 19,000 ft. 6 and 8-in. c. i.
Sidney: Water supply system, including filtration.

North Carolina—
Durham: $500,000.00. Bids April 21.

North Dakota—
Minot: Intake, 1. Mains, 10,560 ft. 6-in. c. i.

Ohio—
Akron: $600,000 bonds authorized.
Athens: Mains, 5,027 ft. 6 and 14-in. c. i.
Cambridge: $235,000 bonds sold for complete system.
Canton: Reservoir and improvements to cost $425,000 recommended.
Cincinnati: Mains, 33½ miles 4 to 42-in. c. i.
Coshocton: Reservoir, concrete covered, 3,000,000 gal.
Dayton: $150,000 bonds sold for distribution system.
East Liverpool: Rebuild city water plant, pumps, station, standpipe, etc.
Greenville: $10,000 appropriated to test present well field.
Lorain: Boilers, 2.
Mansfield: Pumps, 2. Each has 375,000 gals. cap. per 24 hrs. Mains, 5500 ft. 4-in. c. i.
Middletown: Boiler, 1.
South Charleston: $30,000 bond issue will be voted on.
Troy: Mains, 1,000 ft. 3-in. c. i.. 500-h.p. heater for boiler supply.
Wooster (probably): Boilers, 2. Pumps, 4. Buildings, boiler, pump and filter house. Settling basin, 1 60-ft. by 61-ft. Filter plant. 1 2,000,000 gal. Reservoirs, 1 1,000,000-gal. steel tank. Mains, 12,000 ft. 12 and 16-in. c. i.

Oklahoma—
Enid: Mains, 1,200 ft. 6-in. c. i.
Tulsa: Settling basin, $60,000. Mains, 5,000 ft. 6-in. c. i.
Wilburton: To vote on $100,000 bond issue.

Oregon—
Fairview: Municipal plant.

Pennsylvania—
DuBois: Reservoir to be raised 4 ft. Mains, 3,000 ft. 6 and 8-in. c. i.
Franklin: Mains, 2,500 ft. 6-in. c. i.
Homestead: Mains, 1,800 ft. 6-in. c. i.
Oil City: Mains, 2,000 ft. 6, 8 and 12-in. c. i.
Pittsburgh: Boiler, 1,000 h.p. Pumps, 50,000,000 gal. centrifugal. Mains, 5 miles 6 to 20-in. c. i.

South Caolina—
Orangeburg: Boilers, 2. Pumps, 1. Buildings, 1. Wells, 1. Reservoirs, 2. Mains, 6,000 ft. 6, 8 and 10-in. c. i.

South Dakota—
Summitt: Bond issue voted.

Tennessee—
Maryville: $55,000 bond issue proposed.

Texas—
Ennis: Pump, 1. Building, 1. Mains, 16,000 ft. 4 and 8-in. c. i.
Houston: Magnolia Park Water Works, $85,900.

Utah—
Logan: Reservoir, $10,000. Intakes, $2,000.
Ogden: $75,000 bond issue for improvements.

Water Works Improvement—Continued

Washington—
Aberdeen: Oil burners. Pump, 1 centrifugal, 250-ft. head. Reservoir, 7,250,000 gal. Mains, 7,000 ft. 6 and 8-in. c. i.
Bellingham: Mains, 1½ miles, 6 to 12-in c. i.
Everett: Plans under way for bringing water to city from mountain stream 24 miles. Cost about $600,000.00.
Seattle: Mains, 10 miles c. i.
Spokane: Boiler, 1, 75 h.p. Buildings, 3. Mains, 1½ miles 24 and 30-in. steel; 28,000 ft. 4 to 12-in. c. i. 85 fire hydrants, 4 and 6-in.
Walla Walla: Reservoir, 80,000 gal.

Wisconsin—
Madison: Mains, 5 miles 6 to 16-in. c. i.
Sheboygan: Boilers, 300 h.p. Pumps, 8,000,000 gal. per day. Buildings, addition to pump house. Mains, 23,000 ft. 4 to 20-in. c. i.

Wyoming—
Cheyenne: Filter plant.
Laramie: Mains, 24,000 ft. c. i.

LIGHTING IMPROVEMENTS

Arkansas—
Horatio: Electric light plant contemplated.

California—
Alhambra: 3 to 5 miles extension of ornamental lighting.
Long Beach: 6 miles ornamental lighting.
Pasadena: 5 miles ornamental lighting.
Pomona: 206 posts, 3 lights each, now being advertised.
Santa Barbara: 1 mile ornamental lighting.

Colorado—
La Junta: $75,000 bonds voted for municipal plant.

Connecticut—
New Haven: 20, 4-amp. luminous arcs; 30 Welsbach gas lamps, 60-c.p.

Georgia—
Cordele: Preparing to construct electric lighting system.
Rome: 2 blocks white way extension.

Illinois—
Elgin: Bond issue for $125,000.00 new plant to be voted on.
Waukegan: 164 ornamental lights.

Indiana—
Connersville: 10-yr. street lighting contract soon.
Covington—$5,500 improvement to plant.
Garrett—Rebuild $500 worth electric light lines.
Huntington: City plant being rebuilt.
Lebanon: Overhead street lighting system and ornamental post lighting system to be let in April.
Peru: Car load of poles. Ornamental lighting under consideration.
Richmond: Ornamental lighting contemplated.
Valparaiso: Poles, 500. Lamps, 300 nitrogen.
Vincennes: 60 ornamental light posts.

Iowa—
Cedar Falls: Poles, 1 car load. Ornamental lighting, 22 poles.
Council Bluffs: Municipal plant contemplated.

Kansas—
Chapman: $10,000 bond issue to be voted on.
Independence: One dynamo.
Leavenworth: 200 5-lamp ornamental lighting poles.
Topeka: 68 5-lamp poles. Cost $9,750.

Kentucky—
Covington: Joint municipal plans for Covington and Newport urged.
Lexington: $14,000 ornamental lighting.

Louisiana—
New Orleans: Publicity owned lighting system being urged.

Massachusetts—
Stoneham: 10 new lights.

Michigan—
Benton Harbor: 2 miles ornamental curb lights.
Cadillac: Boulevard lighting system to be installed.
Dowagiac: 125 k.w. engine and generator. 1 car cedar poles.
Hancock: $100,000 bond issue for municipal plant.
Monroe: One new engine.
Pontiac: Boulevard lighting system contemplated.
Saginaw: 500 luminous arc or nitrogen street lights.

Minnesota—
Mankato: Ornamental lighting system.

Mississippi—
Hattiesburg: Municipal plant contemplated.

Missouri—
Columbia: Rebuild 1½ miles of line. Wire, 13,000 lbs. No. 20. Poles, car of 40-ft. and car of 20-ft.

Montana—
Billings: 50 5-lamp ornamental posts.
Bozeman: 80 single light poles.

Nebraska—
Beatrice: $10,000 for extensions.
Broken Bow: $10,000 bond issue voted in April.
Omaha: $90,000 fund for municipal plant recommended.
Sidney: $35,000 being spent on plant.

New Jersey—
Perth Amboy: $150,000 bond issue to construct Municipal plant.

New York—
Batavia: Dynamo and motors to be purchased.
Bath: Lighting system, $24,350.
Buffalo: 1,200 magnetite arc lamps.
Utica: 15 arc lights. 100 latest incandescent lamps as experiment. May replace 1,000 aerial lamps with same kind.

North Carolina—
Kinston: $25,000 to be spent in addition to electric light plant.

North Dakota—
Minot: 60 ornamental lighting posts.

Ohio—
Cincinnati: 320 4-amp. magnetite lights. Wire, 56 miles. Poles, 1,100 Idaho cedar. Ornamental lights, 36 400-watt nitrogen. Gas lamps and posts, 100 Welsbach.
Dayton: New contract for gas lights to be made.
Elyria and Lorain considering erection of joint electric light plant.
Mansfield: Bids to be received for 5 or 10 year contract.
Middletown: Ornamental system planned.
Nelsonville: Engine, 1. Gas plant improvements.
Newark: 500-k.w. turbo-generator.
Springfield: Cluster lighting system in center of city contemplated.
Troy: 1 67-k. v. a. generator. 8 ornamental bridge lights and posts.
Washington C. H.: 600-c.p. nitrogen lamps.

Oklahoma—
Woodville: Electric light system being considered.

Pennsylvania—
High Spire: Municipal electric light plant being considered.
Kane: 2 miles electric lights.
Pittsburgh: 300 arc lamps. 300 mantle gas lamps.

South Carolina—
Blackville: Plant to be improved.
Orangeburg: $30,000 bond issue to be voted on.

South Dakota—
Raymond: Municipal plant proposed.

Texas—
Houston: Municipal plant contemplated.
Laredo: Ornamental park lighting.
Sulphur Springs: Will improve electric lighting system.

Wisconsin—
Madison: 400 ornamental lights.
Wausau: $1,300 changing arc light system.

BRIDGES AND BUILDINGS IN CITIES

Alabama—
Anniston: Several small bridges.
Bessemer: $30,000 school bonds to be sold in April.

Arkansas—
Ashdown: High school.

California—
Alhambra: $200,000 schools now being constructed. $35,000 library now being constructed.
San Francisco: Two subways.
San Jose: 100-ft. concrete arch.
Santa Barbara: Seven concrete bridges.
Santa Rosa: Two bridges.

Colorado—
Canon City: City hall.
Greeley: Court house, $137,355.

Connecticut—
Bristol: Two concrete bridges.
Danbury: $30,000 to $40,000 bridge over N. Y. & N. H. R. R.
Torrington: One steel girder bridge. One concrete bridge.
Waterbury: $75,000 3-span concrete bridge. One high school. Two grade schools.

Florida—
Miami: Two concrete bridges.

Georgia—
Rome: Three concrete bridges, $260,000. City hall and auditorium, $100,000. Hospital, $50,000.
Valdosta: One concrete bridge.

Illinois—
Alton: One viaduct. One subway.
Aurora: One concrete bridge.
Cairo: Subway.
Decatur: $60,000 concrete subway.

Indiana—
Anderson: Possibly $150,000.00 city hall.
Connersville: Three concrete bridges.
Garrett: $2,000 to be spent on city hall.
Logansport: City hall, $60,000.
Rich Valley: $18,000 school house.
Valparaiso: $50,000 city hall.
Vincennes: City hall repairs, $3,000.
Whitestown: High school.

Iowa—
Ames: City hall and fire station.

Kansas—
Atchison: School house, $34,895.
Independence: Four small concrete bridges. $45,000.00 city building.
Leavenworth: 2 stone arches 40 ft. by 40 ft.
Leavenworth: 2 stone arches 40 by 40 ft.
Salina: One 2-span 160-ft. concrete arch.
Topeka: Two 100-ft. concrete arches. Reinforced concrete viaduct.

Kentucky—
Mayfield: Two 20-ft. by 60-ft. concrete bridges.

Massachusetts—
Adams: Hospital.
Beverly: One steel girder bridge.
Brookline: Two concrete and steel bridges.
Chicopee: School house, $75,000.
Gloucester: Hospital.
Newburyport: Two brick school houses.
Rome: Two schools.
Salem: Sixteen-room school, $150,000. Fire stations, 2.
Westfield: Sixteen-room school asked for.

Michigan—
Benton Harbor: Post office site to be chosen.
Flint: 60-ft. concrete arch. 1,500-yd. asphalt plant. Reinforced concrete subway, 54 ft. by 110 ft.
Marquette: One steel girder bridge. 20 ft. by 60 ft.

Minnesota—
Austin: One concrete bridge.
Mankato: Concrete arch, $80,000.

Bridges and Buildings in Cities—Continued

Mississippi—
Greenville: High school.
Gulfport: High school, $50,000.
Meridian: Two concrete bridges, $7,000. City hall, $100,000. Jail, $3,000. Stables, $5,000.

Missouri—
Carthage: One bridge contemplated.
Sedalia: City hospital contemplated.
Webb City: One concrete bridge.

Montana—
Billings: $25,000.00 school.

Nebraska—
Grand Island: Hospital.
Lincoln: 25-ft.-span concrete bridge.

New Hampshire—
Laconia: 18-ft. concrete bridge.

New Jersey—
Bayonne: City hall.
Camden: $400,000 high school. Two concrete bridges.
Ridgewood: 30-ft. steel girder bridge. High school.

New York—
Buffalo: $170,000 bridge over Buffalo river.
Cortland: School.
Gloversville: One concrete bridge.
Plattsburg: $200,000 concrete bridge. $200,000 city hall and library.
Utica: $430,000 high school.

North Dakota—
Minot: One viaduct. One subway.

Ohio—
Akron: Amory and auditorium.
Cleveland: Model high school and school offices, $1,000,000.
Cincinnati: 25 small concrete bridges, $50,000. Reinforced concrete steps, $25,000. Court house, $1,385,480.00. Bath house, $28,000. Viaduct, reinforced concrete, 180-ft. span, $165,000. Two grade crossing elimination viaducts, $250,000.
Dayton: School house.
Hamilton: Concrete arch over Miami river, $85,000 estimate.
McComb: City hall, $8,450.
Norwood: Two concrete bridges.
Toledo: School house, city hall.
Vandalia: School house.
Warren: Two bridges.

Oklahoma—
Enid: One concrete arch, 20-ft. span.
Tulsa: $4,000 city market.

Oregon—
Medford: Addition to city hall.
Portland: School houses, $169,000; docks, $90,000; park building,s $4,300; auditorium, $600,000; market, $4,000; hospitals, $375,000; bridges, $435,000; viaduct, $6,000.

Pennsylvania—
Allentown: City garage.
Archbold: Five concrete bridges.
Ashley: $3,000 steel girder bridges.
DuBois: One 24-ft. concrete bridge.
Harrisburg: $270,000 concrete arch over Susquehanna river.
Juniata: Market house.
Meadville: $16,000 remodeling city hall.
North Braddock: School house.
Pittsburgh: 46-ft. steel girder bridge.

Rhode Island—
Cumberland: $65,000 concrete bridge.
Newport: School.

South Carolina—
Orangeburg: Two concrete bridges.
Ridgeland: Court house and jail.

South Dakota—
Ashton: $6,000 municipal building.
Lead: 336 yds. of concrete culverts.

Tennessee—
Jackson: 50-ft. by 14-ft. concrete bridge.
Memphis: School house.

Texas —
Laredo: Two concrete arches, $6,000 each. City market, $5,000.00. Viaduct, $8,000.00.
Paris: Three school houses, $75,000.00.

Washington—
Aberdeen: Single leaf 125-ft. bascule bridge. Auditorium. Public market.
Walla Walla: $5,000.00 concrete bridge.

Wisconsin—
Appleton: 120-ft. concrete bridge.
Green Bay: $55,000 bascule bridge.
Madison: 60-ft. concrete arch.
Racine: $7,185 bridge at Horlicks Dam.
Sheboygan: High school.

Wyoming—
Douglas: Court house, $40,000.00.

COUNTY ROAD BRIDGES

Alabama—
Hamilton, Marion county: 3 steel girder bridges.
Jasper, Walker county: 4 steel girder bridges.
Montgomery, Montgomery county: $30,000 bridge.
Talladega, Talledaga county: 410-ft. steel girder bridge.
Tuscumbia, Colbert county: 2 or 3 steel girder bridges.

Arizona—
Holbrook, Navajo County: 8 concrete bridges.
Yuma, Yuma county: 10 wooden bridges, 10 to 16-ft. span.

Arkansas—
DeWitt, Arkansas county: $3,000 for bridges.
Paragould, Green county: 5 steel bridges.

California—
Colusa, Colusa county: 59 concrete bridges.
Fairfield, Solano county: 7 concrete bridges.
Los Angeles, Los Angeles county: 200-ft. steel truss. 880-ft steel girder. 5 60-ft. steel girder.
San Diego, San Diego county: 5 concrete bridges, 25 to 400-ft. span.
Weaverville, Trinity county: One suspension cable bridge.

Delaware—
Georgetown, Sussex county: 10 draws, to cost $4,000.00. One highway bridge, $3,000.00.

Florida—
Miami, Dade county: Steel draw bridge, $23,000.00.
St. Augustine, St. John county: 4 concrete bridges.

Idaho—
40 steel girder bridges and 50 concrete bridges in the state.

Illinois—
Albion, Edwards county: 2 concrete bridges.
Bloomington, McLean county: Steel bridge, $4,650.00.
Bluff, Scott county: Concrete bridges, 60-ft., 90-ft. and smaller.
Bunker Hill, Macoupin county: 5 concrete bridges, $4,750.00.
Cambridge, Henry county: 5 concrete bridges.
Canton, Fulton county: 230-ft. steel truss bridge.
Carmi, White county: 20 steel girder bridges. 20 concrete bridges.
Elizabethtown, Hardin county: One steel girder bridge. Two small concrete bridges.
Freeport, Stephenson county: $25,000.00 concrete bridges.
Galesburg, Knox county: 60-ft. steel girder bridge. 30 concrete bridges.
Garison, Hamilton county: 10 steel girders, 10 to 100 ft. 9 concrete bridges.
Jesseyville, Jersey county: 3 steel girders, 80-ft., 80-ft., 120-ft. 15 concrete bridges.
Kankakee, Kankakee county: 10 concrete bridges, 18 to 40-ft.
Louisville, Clay county: 5 steel girders.
Mackinaw, Tazewell county: 10 concrete bridges.
Marion, Williamson county: 4 concrete bridges.
Monmouth, Warren county: 4 steel girders. 2 concrete bridges.
Mound City, Pulaski county: 6 small concrete bridges.
Mt. Carroll, Carroll county: 20 concrete bridges, 6 to 50 ft. 2 subways.
Mt. Sterling, Brown county: 5 concrete bridges.
Nashville, Washington county: 12 to 20 concrete bridges.
Newton, Jasper county: $18,000 concrete bridge.
Oswego, Kendall county: 12 concrete bridges.
Peoria, Peoria county: 1 concrete arch, 4 concrete bridges.
Polo, Ogle county: 2 steel girders. 40 concrete bridges.
Pontiac, Livingston county: $8,670.00 concrete arch.
Princeton, Bureau county: 2 steel girders, 85-ft. spans. 6 concrete bridges, 30-ft. spans.
Robinson, Crawford county: 70-ft. truss bridge. 60 concrete bridges, 4-ft. to 50-ft.
Rockford, Winnebago county: 50 concrete bridges.
Rock Island, Rock Island county: Steel bridges across Fancy creek.
Rushville, Schuyler county: 1 steel girder. 6 concrete bridges.
Shelbyville, Shelby county: 35 concrete bridges.
Sorento, Bond county: 15 or 20 concrete bridges.
Springfield, Sangamon county: 3 steel girders; 6 concrete bridges.
Stockton, Jo Daviess county: 18 concrete bridges, 12 to 60 ft.
Stronghurst, Henderson county: $10,000 concrete bridges.
Taylorville, Christian county: 3 steel girders, 50-ft., 370-ft., 425-ft. 3 concrete bridges, 24-ft., 24-ft., 30-ft.
Vienna, Johnson county: 7 small concrete bridges.
Watseka, Iroquois county: Several concrete bridges.

Indiana—
Boonville, Warrick county: 25 steel girders. 5 concrete bridges.
Brownstown, Jackson county: 6 bridges, $400.00 to $2,500.00.
Columbia City, Whitby county: Several bridges.
Columbus, Bartholomew county: 1 steel girder. 3 concrete bridges.
Dana, Vermillion county: Several concrete bridges.
Greencastle, Putnam county: 1 wood bridge. 3 concrete bridges.
Greenfield, Hancock county: 1 steel girder. 9 concrete bridges.
Lawrenceburg, Dearborn county: 5 bridges, 30 to 300-ft. spans.
Peru, Miami county: 1 steel girder. 2 concrete culverts.
Plymouth, Marshall county: 6 concrete bridges, $1,800.00 each.
Rockville, Parke county: 15 concrete bridges.
Spencer, Owen county: 12-ft. by 16-ft. concrete bridge.
Vevay, Switzerland county: 2 steel girders. 30-ft. and 50-ft.
Winchester, Randolph county: 31 bridges.

Iowa—
6,000 concrete bridges in the state.
Adel, Dallas county: $60,000.00 concrete bridges.
Algona, Kossuth county: 20 concrete bridges.
Anamosa, Jones county: 75 concrete culverts and bridges.
Brett, Hancock county: 44 concrete bridges and culverts.
Carroll, Carroll county: 1 steel bridge. 1 concrete bridge.
Centerville, Appanoose county: 50 concrete bridges and culverts.
Cherokee, Cherokee county: 50 concrete bridges.
Clarion, Wright county: 30 concrete bridges, $25,000.00.
Clinton, Clinton county: 2 steel girders. 20 concrete bridges.
Davenport, Scott county: $20,000 steel and concrete bridges.
Denison, Crawford county: $40,000.00 worth bridges.
Des Moines, Polk county: 50,000 concrete bridges.
Dubuque, Dubuque county: 127 concrete bridges, $48,340. 2 viaducts, $28,200. 1 subway, $6,000. 75 culverts and bridges.
Elkader, Clayton county: 24 culverts, 3-ft. to 8-ft. 6 girders, 25 to 40-ft.
Emmettsburg, Palo Alto county: 4 girders. 50 or 60 concrete bridges.
Estherville, Emmett county: 20 concrete bridges and culverts. 1 viaduct.
Fairfield, Jefferson county: 2 steel truss bridges. 60 concrete bridges and culverts.
Forest City, Winnebago county: 25 concrete bridges and culverts.
Ft. Dodge, Webster county: 14 girder bridges. 1 steel truss bridge, 100-ft. 2 deck girder concrete bridges.
Fort Madison, Lee county: 10 concrete bridges and culverts, $15,669.

County Road Bridges—Continued

Greenfield, Adair county: 140 concrete bridges and culverts.
Ida Grove, Ida county: 11 steel truss bridges. — concrete culverts.
Iowa City, Johnson county: 12 steel girders. 30 concrete bridges.
Jefferson, Greene county: 7 concrete bridges, $7,293.
Keosauqua, Van Buren county: 10 concrete bridges.
Knoxville, Marion county: 5 steel truss bridges. 4 steel beam bridges. 80 concrete bridges and culverts.
Logan, Harrison county: 10 steel truss bridges. 25 concrete bridges.
Manchester, Delaware county: 3 steel truss bridges. 4 I-beam bridges. 50 to 55 concrete bridges and culverts.
Marion, Linn county: 14 bridges and culverts.
Mason City, Cerro Gordo county: 2 steel bridges. 50 concrete bridges.
Osage, Mitchell county: 130 concrete bridges and culverts.
Montezuma, Poweshiek county: 6 steel truss bridges. 2 concrete bridges. 1 viaduct.
Nevada, Story county: 6 steel trusses. 200 concrete bridges and culverts.
Oskaloosa, Mahaska county: 41 concrete bridges.
Rock Rapids, Lyon county: 30 concrete bridges, 4 to 30-ft.
Sac City, Sac county: 200 concrete culverts.
Sigourney, Keokuk county: 30,000 concrete bridges.
Tipton, Ada county: 7 steel bridges. 125 concrete bridges.
Toledo, Tama county: $50,000 steel and concrete bridges.
Washington, Washington county: 60 concrete bridges.

Kansas—
Cimarron, Gray county: 4 small concrete bridges.
Clyde, Cloud county: 5 concrete, 20 to 70-ft.
Council Grove, Morris county: 1 steel truss bridge. 14 concrete bridges.
Dodge City, Ford county: 3 small concrete bridges.
Eldorado, Butler county: 2 stone arches. 5 concrete bridges.
Eureka, Greenwood county: 80-ft. steel truss. Some small concrete bridges.
Fredonia, Wilson county: 100-ft. 2-span concrete arch.
Garfield: Pawnee county: Bridge over Arkansas river.
Gates Center, Woodson county: 3 steel girder bridges. 4 stone arch bridges. 8 concrete bridges.
Hoxie, Sheridan county: One concrete bridge.
Jetmore, Hodgeman county: $1,500 concrete bridges.
Lakin, Kearney county: 4 concrete bridges.
Lyndon, Osage county: 2 or 3 concrete bridges.
Newton, Harvey county: 6 or 7 concrete bridges.
Russell, Russell county: 2 steel girder bridges. 1 concrete bridge.
Topeka, Shawnee county: One 3-span concrete bridge. 4 32 to 80-ft. concrete bridges.
Troy, Doniphan county: One steel girder. 5 concrete, flat top.
Washington, Washington, county: One steel truss. 150 to 200 concrete bridges.

Kentucky—
50 steel bridges and 400 concrete bridges and culverts in the state.
Bardwell, Carlisle county: 4 steel girders.
Bowling Green, Warren county: 3-span 289-ft. steel girder.
Burlington, Boone county: 2 steel girders, 100-ft. and 160-ft.
Caneyville, Grayson county: 1 steel girder bridge.
Danville, Boyle county: 2 concrete bridges.
Henderson, Henderson county: 15 steel and concrete.
Hyden, Leslie county: 300-ft. girder.
Madisonville, Hopkins county: 9 concrete bridges.
Paducah, McCracken county: 4 steel girders. 12 concrete bridges.
Stanford, Lincoln county: 12 steel girders. 2 concrete bridges.
Vanceburg, Lewis county: Several concrete bridges.
Versailles, Woodford county: $500 concrete bridge.

Maryland—
Centreville, Queen Anne county: 3 concrete bridges.
Easton, Talbot county: 2 concrete bridges, 300-ft. and 100-ft.

Massachusetts—
12 concrete bridges in the state.

Michigan—
Bessemer, Gogebic county: 20-ft. steel girder. 10-ft. concrete culvert.
Crystal Falls, Iron county: 3 concrete, 50-ft. span.
Escanaba, Delta county: 342-ft. steel girder.
Hillsdale, Hillsdale county: 5 concrete bridges.
Manistee, Manistee county: Steel girder bridge.
St. Ignace, Mackinac county: 2 state bridges.
West Branch, Ogeman county: 10 steel girders. 15 concrete bridges.

Minnesota—
Alexandria, Douglas county: $1,600 concrete bridge.
Bomidji, Beltrami county: 10 steel and concrete bridges.
Blue Earth, Faribault county: 2 concrete bridges.
Fairmount, Martin county: $10,000.00.
Granite Falls, Yellow Medicine county: $13,500.00.
Ivanhoe, Lincoln county: 5 steel girders. 35 to 50 concrete bridges.
Mora, Kanabec county: 4 steel truss bridges, 40 to 90-ft.
Red Lake Falls, Red Lake county: 3 steel girder bridges.
Shakopee, Scott county: 7 concrete bridges.
Wheaton, Traverse county: 12 steel and concrete bridges.
Willmar, Kandijohi conuty: 15 steel girder bridges.
Windom, Cottonwood county: 10 to 15 concrete bridges.

Missouri—
Bethany, Harison county: 22 girder bridges. 3 truss bridges. 6 concrete bridges.
Bolivar, Polk county: 30 2-ft. to 40-ft. culverts and bridges.
Buffalo, Dallas county: 30 2-ft. to 40-ft. culverts and bridges.
Chamois, Osage county: 300-ft. steel bridge. 5 or 6 concrete bridges.
Charleston, Mississippi county: 15 steel truss bridges, 40 to 65-ft.
Clayton, St. Louis county: 5 girders.
Columbia, Boone county: 30 girders.
Exeter, Barry county: 1 girder. 10 concrete bridges.
Jackson, Cape Girardeau county: 4 girder bridges. 2 concrete bridges.
Jefferson City, Cole county: 50-ft. and 170-ft. steel truss bridges.
Ironton, Iron county: 2 concrete bridges.
Kingston, Caldwell county: $1,200 girder. 1,000 cu. yds. concrete bridges.
Lentner, Shelby county: 25 girder bridges. 100 concrete bridges and culverts.
Luray, Clark county: 10 concrete bridges.
Macon, Macon county: 20 steel bridges.
New Madrid, New Madrid county: 10 steel girders, 30 to 75-ft.
St. Charles, St. Charles county: $2,000 concrete bridge.
Troy, Lincoln county: 6 concrete bridges.
Warrenton, Warren county: 4 girder bridges. 3 concrete bridges.

Montana—
Billings, Sheridan county: Bridge over Yellowstone river.
Bozeman, Gallatin county: 30 girder bridges 12 to 32 ft. long.
Roundup, Musselshell county: 9 girders. 3 subways.

Nebraska—
Beatrice, Gage county: 15 girders. 10 concrete bridges.
Blair, Washington county: 5 girders, 60-ft. each. 30 concrete bridges.
Center, Knox county: $25,000 for bridges.
Clay Center, Clay county: $10,000 for bridges.
Freemont, Dodge county: 10 girders, 18 to 40-ft.
Kimball, Kimball county: One girder.

New Mexico—
Las Vegas, San Miguel county: $3,000.00 girder.
Raton, Colfax county: 5 steel girders, $1,900.00.

New York—
Auburn, Cayuga county: 18 girders, 5 to 34-ft.
Canandaigua, Ontario county: 4 concrete bridges.
Ellicottville, Cattaraugus county: 25 girders, $40,000.
Fonda, Montgomery county: 1 steel girder. 6 concrete bridges.
Friendship, Allegany county: 50 concrete bridges.
Herkimer, Herkimer county: 10 concrete bridges.
Ithaca, Tompkins county: 2 girders, 65 to 70-ft. 18 concrete bridges, 6 to 30-ft.
Lockport, Niagara county: 2 steel girders. 20 concrete bridges up to 300-ft.
Malone, Franklin county: 2 steel girders. 20 concrete bridges.
Oneida, Madison county: 2 steel girders. 15 concrete bridges.
Saratoga Springs, Saratoga county: 450-ft. steel truss. 100-ft. concrete arch. 25 small concrete arches.
Watertown, Jefferson county: 52 concrete bridges. 450 concrete culverts.

North Carolina—
Bryson City, Swain county: $15,000 girders.
Mt. Airy, Surry county: 3 girders.

North Dakota—
Cavalier, Pembina county: 8 girders, 12 to 16-ft.
Center, Oliver county: 2 stone arches. 2 concrete bridges.
Dickinson, Stark county: 400-ft. bridge over Little Missouri, $25,000.
Grand Forks, Grand Forks county: $29,000.

Ohio—
Cambridge, Guernsey county: girder, 160-ft. span.
Canton, Stark county: 2 girder bridges. 3 concrete bridges.
Celina, Mercer county: 8 girder bridges. 12 concrete bridges.
Columbus, Franklin county: 2 concrete bridges. 1 subway.
Dayton, Montgomery county: 2 girders.
Hamilton, Butler county: 730-ft. concrete bridge.
Howard, Knox county: 1 girder bridge. 4 concrete bridges.
London, Madison county: 1 girder bridge.
McConnellsville, Morgan county: 80-ft. concrete bridge.
Ottawa, Putnam county: $8,000 concrete bridge.
Toledo, Lucas county: $90,000 for bridges.
Van Wert, Van Wert county: 12 concrete bridges.
Wauseau, Fulton county: $8,000 girder. $5,000 for 10 concrete bridges.
Wilmington, Clinton county: $14,000 for bridges.
Zanesville, Muskingum county: 2 girders contemplated.

Pennsylvania—
Honesdale, Wayne county: 1 girder bridge. 3 concrete bridges.
Huntingdon, Huntingdon county: 1 concrete bridge.
Lebanon, Lebanon county: 3 concrete bridges.
Pittsburgh, Allegheny county: $20,000 for concrete bridges.
Reading, Berks county: 4 concrete bridges.
Scranton, Lackawanna county: 4 concrete bridges.

Texas—
Bay City, Matagorda county: 3 105-ft. girders.
Dallas, Dallas county: 4 steel bridges. $45,000.
Edna, Jackson county: 20 concrete culverts.
Fort Worth, Collins county: 30 concrete bridges, 10 to 60-ft.
Gatesville, Coryell county: 5 steel girders.
Hillsboro, Hill county: 80-ft. girder. 27 concrete bridges, 4 to 60-ft.
Lockhart, Caldwell county: 27 girder bridges.

Virginia—
75 steel and 25 concrete bridges in the state.
Fredericksburg, Fredericksburg county: Joint bridge over Massponax river contemplated.
Pearisburg, Giles county: $2,000.00 steel girder.
Suffolk, Nansemond county: $10,000.00 steel girder.

Washington—
Bellingham, Whatcom county: 300-ft. steel bridge, $30,713. Several wood bridges.
Chehalis, Lewis county: Steel bricge, 110 by 18 ft. Steel bridge, 130 by 16 ft. Cantilever bridge, 468 by 20 ft.

Wisconsin—
450 truss, 15 girder, 200 concrete bridges, 2 viaducts in the state.
Algoma, Kewannee county: 1 steel girder. 6 or 8 concrete bridges.
Balsam Lake, Polk county: 4 girders.
Baraboo, Sauk county: 2 girders. 10 concrete bridges.
Chippewa Falls, Chippewa county: 20 concrete bridges.

County Road Bridges—Continued

Darlington, Lafayette county: 8 large concrete bridges. 80 small concrete bridges.
Green Bay: 7 girders. 29 concrete bridges.
Madison, Dane county: 12 concrete bridges.
Milwaukee, Milwaukee county: 17 concrete bridges.
Osseo, Trempealeau county: 9 bridges.
Rhinelander, Oneida county: 10 bridges.
Rice Lake, Barron county: 1 girder. 4 concrete bridges.
Richland Center, Richland county: 1 girder, 4 concrete bridges.
Shawano, Shawano county: 3 girders. 3 concrete bridges.
Sparta, Monroe county: 36-ft. girder. Two 16-ft. concrete bridges.
Stevens Point, Portage county: 7 girder bridges.
Superior, Douglas county: 2 girders. 3 concrete bridges.
Thiensville, Ozaukee county: $5,800 for concrete bridges.

GARBAGE COLLECTION AND DISPOSAL

Alabama—
Florence: Wagon, 1.

Arkansas—
Hot Springs: Incinerator proposed.

Delaware—
Wilmington: Reduction plant.

Florida—
Miami: Destructor under construction.

Georgia—
Valdosta: Crematory, 1.

Illinois—
DeKalb: Disposal of sewage demanded.
Rock Island: Incinerator or disposal plant.

Indiana—
Richmond: Add 3 10-ton units to plant.

Kansas—
Arkansas City: Planning incinerator.
Coffeyville: New equipment for handling garbage.
Fort Scott: $25,000 to be spent for disposal plant.
Independence: $5,000 for disposal plant.

Massachusetts—
Revere: 2 garbage carts. 5 horses.
Stoneham: Carts, 1. Horses, 2.

Michigan—
Benton Harbor: Incinerator proposed.
Monroe: Wagon, 1.

Minnesota—
Owatonna: Wagons.

Missouri—
Sedalia: Dump wagon, 1.

Montana—
Billings: Wagon, 1. Auto self-dumping truck, 1.

New Jersey—
Montclair: Incinerator plant contemplated.

Ohio—
Akron: Equipment for new plant.
Dayton: $45,000 for equipment and plant.
Norwood: Incinerator.

Pennsylvania—
Coraopolis: Incinerator, 1. Wagon, 1.
York: Disposal works and pumping station.

Virginia—
Newport News: Disposal plant contemplated.

Washington—
Everett: Dock, 1. Dumping scow, 1. Wagons, 3. Horses, 3.

West Virginia—
Huntington: Site purchased for disposal plant.

Wisconsin—
Sheboygan: Type of plant undecided.
Welt Allis: Incinerator planned.

STREET SIGNS

Connecticut—
Bristol: Copper bronze, 3½ by 4½ in., to number city complete.
New Haven: 500 iron, 300 glass to cost $450.
Waterbury: $3,000.

Illinois—
Oak Park: 100 enamel.
Waukegan: 350 enamel.

Indiana—
Gary: 200 enamel.
Indianapolis: 7,500 street name signs, $2,043.75.

Iowa—
Waterloo: Renaming of streets planned.

Kansas—
Fort Scott: $400.
Independence: New wood signs thruout.

Kentucky—
Covington: 2,100 enamel.

Massachusetts—
Revere: 50 wood.
Salem: 806 wood.
Stoneham: 100.

New York—
Newburgh: 210 ingot iron stamped signs.

North Carolina—
Durham: 230 enamel.

North Dakota—
Minot: 200 4-way enamel.

Ohio—
Akron: 2,700, kind not decided.
Cincinnati: 1,500 iron posts and enamel signs.
Painesville: Kind and number not decided.
Wooster: 2 Lincoln Highway signs.

Oregon—
Eugene: 960 wood.
Portland: $800.

Pennsylvania—
Allentown: 443 enameled steel signs.
Freeland: Porcelain enameled iron street signs.
Pittsburgh: 500 Early crisscross model. 25 Lincoln Highway signs.

COUNTY ROAD SIGNS

Arizona—
Holbrook, Navajo county: 30 metal.
Kingman, Mohave county: All county roads to be signed.

Arkansas—
Grannis, Polk county: 50 wood signs.
Paragould, Green county: 6 signs.

Florida—
St. Augustine, St. Johns county: 24 large "safety first."

Illinois—
Garrison, Hamilton county: 100 sign boards.
Mt. Carroll, Carroll county: 150 permanent cross-roads signs.
Mt. Sterling, Brown county: 25 signs.

Indiana—
Dana, Vermillion county: 150 sound Klaxon. 100 Goodyear tire.

Iowa—
Fairfield, Jefferson county: 50 18-in. by 24-in. Klaxon danger signs.
Iowa City, Johnson county: 160 mile posts and road names.

Kansas—
Abilene, Dickinson county: Signs for 200 miles road.
Beloit, Mitchell county: 20 wood signs.
Dodge City, Ford county: Distance signs.
El Dorado, Butler county: 20 board signs.
Lakin, Kearney county: 20 signs.
Newton, Harvey county: Considerable.
Tribune, Greeley county: 36 iron posts, galvanized plates.
Wichita, Sedgwick county: 100 to 150 miles will be marked.

Kentucky—
Bowling Green, Warren county: 50 signs.

Maryland—
Easton, Talbot county: 50 road signs. 200 danger signs.

Michigan—
Corunna, Shiawassee county: 50 road signs
Crystal Falls, Iron county: 100 metal mileage signs.
Manistee, Manistee county: 20 route signs.
Rogers, Presque Isle county: Klaxon signs at every cross road.

Missouri—
Exeter, Barry county: 200 sign boards.
Ironton, Iron county: 50 sign boards.
Lentner, Shelby county: Mark Ocean to Ocean Highway.
Linn Creek, Camden county: 65 distance signs.
Macon, Macon county: 60 boards on Ocean to Ocean Highway.
Ozark, Christian county: 35 wood signs.

Montana—
Great Falls, Cascade county: Main roads will be posted by Goodrich Tire Co.
Roundup, Musselshell county: 100 wood signs.

New Mexico—
Portales, Roosevelt county: 50 painted tin signs.
Raton, Colfax county: 133 metal signs.

New York—
Canandaigua, Ontario county: 50 concrete posts and wood signs.
Lockport, Niagara county: 200 wood signs.
Malone, Franklin county: 30 metal signs.
Watkins, Schuyler county: 10 highway signs, 20 guide signs.

Ohio—
Akron, Summit county: 200 enameled speed limit. 50 danger.

Texas—
Mason, Mason county: 300 wood signs.

Virginia—
Courtland, Southampton county: 12 distance signs.

FIRE DEPARTMENT ADDITIONS

Alabama—
Bessemer: Hose, 50 ft.

Arkansas—
Russellville: Auto combination, 1.

California—
Fresno: Auto, hose wagon, fire engine.
Santa Barbara: Hose and chemical, 1.

Colorado—
Denver: Auto hook and ladder. Auto triple combination.

Connecticut
Hartford: Auto apparatus, 2.
Torrington: Auto combination, 1.
Waterbury: Horses. $700. Hose, $2,000. Tractor, $5,000. Combination auto hose and chemical, $9,000. Signal system, $2,750.

Georgia—
Valdosta: Auto combination wagon, $7,000.

Fire Department Additions—Continued

Illinois—
Aurora: Combination auto, 1.
Chicago Heights: Hose, 500 ft. Auto combination, 1. Chief's car, 1. Signal system extension.
Elgin: Hose, 600 ft. Combination autos, 2. Signal system, $250.
Oak Park: Auto ladder truck, 1; auto triple combination, 1. Signal system being planned.

Indiana—
Anderson: Hose, 1,000 ft. Combination motor, 1.
Brazil: Horses, 2.
Connersville: Auto hose wagons, 2. Auto ladder wagon, 1.
Elwood: Auto fire truck, 1.
Gary: 90-h.p. ladder truck. Cole, 60-h.p. chief's car.
Logansport: Combination auto, 1.
Noblesville: Auto combination, 1.
Richmond: Auto aerial truck.
Vincennes: Hose, 500 ft.

Iowa—
Clinton: Auto combination, 1; cost $5,500.

Kansas—
Arkansas City: Hose cart building. Hose 500 ft.
Fort Scott: Combination auto, $5,500.
Independence: Hose, 2,000 ft. Pump and hose auto, 1.

Kentucky—
Covington: $10,000 hose house.
Hopkinsville: Auto combination, 1.
Lexington: Station, $8,000. Hose, 2,000 ft.

Maryland—
Baltimore: Hose, 1,000 ft. Auto tractors, 7. Chief's car, 1. Signal system extension.

Massachusetts—
Beverly: Building, 1. Hose, 1,500 ft. Auto ladder tractor. Auto chief's car.
Brookline: Auto ladder tractor. Triple combination auto. Chief's car.
Lowell: Hose, 2,000 ft. 2½-in. Auto apparatus, 2.
Newburyport: Auto combination, 1.
Orange: Hose, $300.
Revere: Auto hose cart.
Salem: Fire stations, 2. Auto combination, 1. Auto ladder truck, 1.
Stoneham: Fire station, 1. Hose, 500 ft.
Woburn: Auto hose truck, 1. Triple combination, 1.

Michigan—
Albion: Hose, 500 ft. Auto truck, 1.
Cadillac: Hose, 250 ft.
Grand Rapids: May motorize 2 depts.
Manistee: May motorize.
Marquette: Two-horse combination truck, 1. Hose, 1,000 ft. Chief's car, 1. Siren signal, 1.
Monroe: Auto combination, 1.
Saginaw: Probably motorize part of equipment.

Mississippi—
Gulfport: Hose, 2,000 ft. Auto apparatus, $5,500.
Hattiesburg: Auto fire truck, 1.
Meridian: Auto chemical, 1.

Missouri—
Carthage: Auto fire truck.

Montana—
Great Falls: Electric siren.

Nebraska—
Beatrice: Auto combination, 1.
Lincoln: Auto chemical truck, 1.

New Jersey—
Camden: $90,000 for motorizing dept.
Jersey City: Auto aerial trucks, 3. Auto fuel wagons, 3.
Westfield: Hose, 1,000 ft.

New York—
Batavia: Auto apparatus probably.
Cortland: Auto hose cart, 1. Auto ladder truck, 1.
Norwich: Hose, 1,000 ft.
Plattsburg: Auto hose or chemical, $9,000.
Schenectady: Auto combination, 1. Auto triple combination, 1.
Utica: Auto apparatus, 5; cost $37,500.

North Carolina—
Goldsboro: Hose, 1,000 ft.

Ohio—
Akron: Building, 1.
Cambridge: Auto combination, $3,000.
Canton: Auto service truck; auto triple combination, 1.
Cincinnati: Hose, $5,000; automobile apparatus, 23; new signal system, $150,000.
Dayton: $37,365 for motors.
East Liverpool: Building, 1.
Fostoria: Auto chemical extinguisher, $8,000.
Girard: Auto fire truck, 1.
Greenville: Auto hose car, 1.
Lorain: Hose, 1,000 ft.
Newark: Auto ladder truck, 1; auto combination, 1.
Portsmouth: Will motorize.
Troy: Auto truck, 1.
Wooster: Hose, 1,000 ft.

Oklahoma—
Chickasha: Hose, 1,000 ft.
Enid: Hose, 1,200 ft.

Oregon—
Portland: Buildings, $55,000; auto apparatus, 3.

Pennsylvania—
Allentown: Hose, 1,000 ft.; signal system extension, 10 boxes.
Ashley: Auto combination, $4,500.
Carlisle: Auto engines, 2.
Coaldale: Auto engine, 1.
Easton: Will motorize.
Franklin: Auto combination, 1.
Oil City: Hose, 500 ft.; signal system extension.
Pittsburgh: Auto combination, 1.
Reading: Auto hook and ladder truck, 1.
Uniontown: Auto fire truck, 1.
Williamsport: Auto combination, 1.

Rhode Island—
Newport: Hose, 1,000 ft.; auto apparatus, 6; chief's car, 1.

South Carolina—
Charleston: Auto triple combination, 1.

Texas—
Ennis: Auto combination, 1; signal system, complete.
Laredo: Building, 1.
Sulphur Springs: Auto combination, 1.

Virginia—
Newport News: Hose, 1,100 ft.; automobile apparatus, 4.

Washington—
Everett: Buildings, 3; hose, 1,000 ft.; auto apparatus, 6.
Spokane: Auto hose carts, 2; auto ladder trucks, 2.

Wisconsin—
Marinette: Hose, 600 ft.
Neenah: Auto combination, 1.
Sheboygan: Horse, 1; hose, 2,000 ft.
Wausau: Auto apparatus.

POLICE DEPARTMENT IMPROVEMENTS

Arkansas—
Hot Springs: Auto patrol wagon, 1.

Connecticut—
Waterbury: Signal system, $2,590.

Illinois—
Elgin: Signal system, $500; combination patrol and ambulance.
Oak Park: Signal system being planned.

Indiana—
Gary: Patrol auto, 1.

Iowa—
Dubuque: Auto patrol wagon, 1.

Kansas—
Independence: Motorcycle, 1.

Massachusetts—
Lowell: Signal system, $1,500; touring car for superintendent.
Newburyport: Signal system.
Revere: Automobile, 1.
Salem: Patrol, 1; ambulance, 1; chief's car, 1; motorcycle, 1.

Minnesota—
Owatonna: Signal system.

New York—
Corning: Auto patrol wagon, 1.
Cortland: Auto patrol wagon, 1.
Gloversville: Motorcycles, 2.
Newburgh: New signal system; motorcycle, 1.

North Carolina—
Durham: Auto patrol wagon, 1.

Ohio—
Akron: Engine house, $40,000.
Cincinnati: New signal system, $45,000.
Newark: Auto patrol wagon, 1.

Pennsylvania—
Allentown: Auto patrol wagon, 1; motorcycle, 1.
North Braddock: Signal system contemplated with fire department.

Rhode Island—
Newport: Auto patrol wagon, 1; motorcycle, 1.

Washington—
Everett: Auto patrol wagon, 1; motorcycle, 1.
Spokane: Auto patrol wagon, 1.

Wisconsin—
Racine: Auto police ambulance.
Sheboygan: Combination auto patrol and ambulance.

PUBLIC IMPROVEMENTS IN PHILADELPHIA, PA.

The following estimate of the proposed expenditures of the Bureau of Highways & Street cleaning of Philadelphia, Pa., on construction and maintenance work during 1915, was received too late for inclusion in the tables on preceding pages.

Grading streets (by contract)	$ 476,939.73
Paving intersections and in front of unassessable property (by contract)	219,532.58
Paving in front of assessable property (by contract)	880,000.00
Resurfacing asphalt streets (by contract)	132,811.65
Repaving (by contract)	986,834.44
Surfacing and resurfacing macadam (by contract)	559,263.95
Repairs on all classes of streets and roads (by contract)	443,437.59
Repairing and painting bridges (by contract)	56,191.15
Repairs to meadow banks, water courses, etc. (by contract)	6,554.27
Grading, curbing and paving footways, etc. (by contract)	10,912.07
Removal and disposal of garbage (by contract)	323,588.00
Cleaning and sprinkling streets (by contract)	1,232,847.00
Removal of ashes, rubbish, etc. (by contract)	543,681.00
Sprinkling macadam and dirt roads (by contract)	25,000.00
Removal of snow and ice (by contract)	2,500.00
Hire of teams (by contract)	50,000.00
Hire of equipment (by contract)	5,500.00
Improvement of the parkway (by contract)	188,923.01
Improvement of South Broad street boulevard (by contract)	59,442.94
Improvement of Northeast boulevard (by contract)	775,788.31
Improvement of League Island Park (by contract)	447,727.54
Contract work	$7,417,475.23
For labor to be employed by the Bureau of Highways.	
Wages for labor on all classes of streets and roads	400,000.00
Repairs to sewers, etc.	45,000.00
Repairs to bridges, etc.	25,000.00
Repairs to meadow banks and water courses	10,850.00
Wages for entomologist's work	2,500.00
Labor	483,350.00
Grand total	$7,900,825.23

QUESTION DEPARTMENT

Treating Water with Chemicals

Can you refer us to back numbers of your magazine containing articles giving information in regard to the treatment of water to be used for domestic purposes with chemicals only. M., Pittsburg, Pa.

The following articles will be of interest in this line:

In vol. xlvii: Calcium Hypochlorite as a Water Disinfectant, p. 137.

In vol. xlvi: A Novel Method of Sterilization of London's Water Supply, p. 47; An Automatic Tiltometer for Applying Chemical to Water in Purifying Process, p. 322; Water Sterilization Plants, p. 11; Sterilization of Water Supplies, Results of Hypochlorite Process, p. 314; Where Should the Coagulant Be Added to Water, p. 235.

In vol. xlv: New Process for Purifying Drinking Water, p. 553; Water Softening and Decoloration at Grand Rapids, Mich., p. 343.

In vol xliv: Efficient Handling of Lime and Chemicals at the Columbus, O., Watering Softening and Purification Works, p. 543; Chlorine or Hypochlorites for Sterilizing Water, p. 145.

In vol. xliii: Purification of Bath Water, p. 159.

In vol. xlii: The Chloride Process for Water Purification, p. 159.

In vol. xl: A New Reisert Water Filtration Plant, p. 305; Chemical Clarification of Water, p. 433.

In vol xxxix: The Sterilization of Water, p. 222.

In vol. xxxviii: Experience with and Results from Municipal Water Softening, p. 383.

In vol. xxxvii: The Sterilization Plant of the Jersey City Water Supply Company, pp. 6, 86, 158.

Cinders for Road Construction

Our support has been asked in connection with the use of cinders in building up certain roads or streets where there is little chance of pavement being put in for a great many years, and where the traffic is rather heavy. Some of these roads are located within industrial centers, where there is considerable amount of clinkers and ash from the power plants, and in some instances the roads are made up of a certain amount of clay which might serve with the cinders or ashes as a binder. Of course, we are not at all familiar with this matter, but it occurred to us that you might possibly inform us to a certain extent, and you doubtless have some records on cinder roads, their relative costs, etc.
M., Minneapolis, Minn.

The writer's rather limited experience with cinders as a paving material has been such that he would not recommend it except for private driveways to stables or garages, where the traffic is very light, and then only when the surface and sub-soil drainage is perfect, so that neither cinders nor foundation can be softened by water. Cinders are usually too soft and porous to stand any material amount of wear from traffic.

Slag from blast furnaces is ordinarily much harder and more desirable than furnace cinder, but this material is seldom successful where the traffic is heavy, even when made into concrete with portland cement. This experience supports the statements regarding cinder.

If cinder is mixed with clay, the latter acting as the binder, something like a sand-clay road results. If surface and subsoil drainage are both good, such a road may be somewhat more satisfactory than cinders alone, but the road cannot be used safely in wet weather and is suitable in any event only for the light traffic of farm roads leading to the main roads.

Fibered Asphalt Pavement

I would appreciate any information you could give me in regard to cork asphalt paving, where purchased and price of same, or any other surface suitable for tennis courts. P., Billings, Mont.

Cork asphalt pavement was tested some years ago in London and elsewhere and there was some attempt to introduce it into the United States. If any of our readers know of its use for any purpose our correspondent would like to know where it has been used and from whom it can be obtained. It was probably too expensive for use for general paving purposes and therefore could not be generally introduced.

The Wood Fiber Asphalt Company, of Charleston, W. Va., is developing a pavement made largely of a certain kind of wood fiber and asphalt which may answer the purpose.

Specifications for Patented Pavements

You probably know that, altho a great deal has been written and published concerning the procedure incidental to the "Specifying and Adapting of Specifications for Patented Pavements, and the Methods of Calling for Bids Thereon," the fact still remains that no correlated data are available that cover the current practice in the various units of government in the United States.

Realizing this and believing that such data will be of considerable interest and value to the engineering profession, the writer has selected the foregoing subject for a thesis.

In order to obtain all the reliable information possible, inquiries are being sent to the highway departments of each state, to the engineers of several of the larger cities, to the technical press, to a number of consulting engineers prominent in the highway work in America, and to the parties interested in the well-known proprietary pavements.

As the public representatives and exponents of the engineering profession, you will naturally be interested in the results of the inquiry, and will appreciate that the value of such an investigation is directly proportional to the information received. Your co-operation is therefore earnestly desired. An expression of your personal opinion, if you are not averse to giving it at this time,

is particularly desired. If you are familiar with any peculiar or otherwise interesting legal statutes covering the use of patented paving materials or construction, references or comments upon these will be very acceptable.

C.

The writer is not disposed to agree with the statement made above that there are no correlated data covering current practice on this subject, tho possibly not quite all the states in the Union are covered by the collections of data made.

Roughly the states may be arranged in three classes: Those in which the use of patented pavements is strictly prohibited; those in which their use is carefully restricted, usually by requiring that ordinary competition in bidding by contractors for the work shall not be restricted and that all contractors pay the same prices for the use of the patented method or for the patented material; and those in which there are no restrictions.

Most states belong to the last named class except indirectly thru application of certain general laws. Very few belong to the first named class at the present time, Indiana being perhaps nearest occupying the prohibition column.

Two owners of patents on methods of construction of municipal improvements have tried out the laws in most of the states having restrictive legislation, and have crystallized practice in those states. A study of the various cases decided concerning the Warren Brothers Company's patents or bitulithic as a paving material and concerning the D. B. Luten patents on reinforced concrete arches will give practically all the necessary information concerning the best methods of admitting patented methods and materials to competition and the laws in the states and ordinances in the cities concerned will give the variations in wording of the provisions intended to safeguard the public at the same time that the public is given the advantages of the improvements covered by the patents.

One publication by Warren Brothers Company, 59 Temple Place, Boston, Mass., entitled "Municipal Powers," gives the decisions in several cases decided in Michigan, Alabama and New York, in which the validity of their patents was involved; and in many cases deciding the validity of contracts for patented pavements in some 15 states. A recent decision of a Rochester (New York) case involving the right of the city to specify a patented pavement is reported in full in another pamphlet, together with the briefs of the attorneys and extensive references to all prior cases having bearing upon the subject.

D. B. Luten, Traction-Terminal Building, Indianapolis, Ind., has published the decisions in many suits for infringement brought by him and in suits to prevent the use of patented bridges. While the nature of the patents is not the same, the nature of the practice in securing and safeguarding their use is very similar and much of value for the thesis referred to can be gathered from Mr. Luten's publications.

In reference to the request for the editor's personal opinion, he would say that there seems to be no valid reason why the public should not have the advantage of the best there may be in paving or any other municipal improvement. That the best may be patented is no valid reason for depriving the city of the right to use it.

A patent is a monopoly so far as the use of whatever is covered by it is concerned. If there is nothing else in the field, it is an unrestricted monopoly, and prices are governed only by what the traffic will stand, or rather by what the owners of the patent think it will stand. But patents on pavements are restricted by the competition of other forms of pavement and must show the superiority of the structures built under them in order to have them accepted. Large profits can be made only by showing qualities high enough to warrant high prices, or because the patented methods result in similar qualities to other pavements at lower cost. In either case the public can avail itself of the benefits of the patent at prices which are reasonable as compared with those which must be paid for other pavements of similar quality. It is only necessary to safeguard the making of specifications and the receiving of bids so that the city will have the benefit of all the competition possible between the patented pavement and other possible materials.

There is a tendency in some laws toward selecting the pavement to be bid upon by vote or petition, and thus restricting competition to those engaged in the construction of that particular class of pavement. It is specially necessary to safeguard the letting of the contract in case a patented pavement is chosen, that the price may be restricted by something more than the immediate self interest of the bidders. This is well done by the general practice of fixing a definite price for the use of patented features, thus putting all contractors on a par, fixing what is previously determined to be a reasonable price for the use of the patented article or method, and leaving the remainder of the construction open to competitive bids.

Practical Aid Wanted for Civic Improvement

A co-operative campaign has been planned between our business men and the city authorities, for a physical rehabilitation of both residential and business districts, to serve the purposes of efficiency, cleanliness and beauty. On one point of this campaign I am instructed by the committee in charge to ask your advice and aid.

It is proposed to perfect in the city a system of street and park commissions, of unpaid citizens, who shall be the medium of contact between the population and the city authorities and the agency of action by both.

It is proposed, further, to conduct a systematic and careful campaign of education, thru the newspapers, by ward and precinct meetings, in business and in residential districts, so that the population will respond to the best efforts of their commissions and likewise stimulate them to better efforts.

To represent the city, to guide these commissioners, to enlighten the volunteer organizations of citizens, it is proposed to employ the services of a man who shall have had technical instruction in architecture and in landscape, street and boulevard designing, and practical experience therein; a man who is in touch with modern movements to clean and beautify and render more convenient the physical arrangement of cities.

We do not want a man to make a "city plan," tho we want a man who knows what city planning is. We want a man, young, but with experience and knowledge; enthusiastic, but practical; who values beauty, but appreciates utility; who can come into an old, rather dirty, haphazardly built city, and to a population rather provincial and untraveled, and in this environment work with a group of public officials and a body of business men who want to do the practical at-hand things that most cry to be done and that can most practically be done. We want a man who can discuss with the commissioner of streets and public property and the dean of the local architects how a certain street may be best and most practically improved so that it will fit into a city plan; who can discuss with the commissioners of a certain street, either residential or business, the practical things to be done; and who can then go to a ward or precinct citizens' volunteer "clean-up" or "improvement" meeting and lead them into the right line of thought and the right line of action.

Our means are rather restricted. We are trying to educate ourselves as we go. We have no large funds upon which to draw. Nevertheless, we believe we can obtain the needed funds. Will you tell us the sum necessary to employ such a man as we have described, for a year?

We want you to recommend to us, or put us in touch with a group of men from among whom we may select one for this service. Will you help us thus far?

SUBSCRIBER.

This problem is passed on to our readers. We will put any one in communication with our correspondent, who is willing to undertake the work outlined in his letter.

WORKERS IN THE FIELD

Ordinance Governing City Forester

The Editor of MUNICIPAL ENGINEERING:

Sir—I note in your last issue on page 196 a request for a city ordinance creating the office of city forester, and take pleasure in enclosing one which amply covers the requirements.

P. S. RIDSDALE,
Executive Secretary, American Forestry Association.

An ordinance to regulate the planting, trimming and removing of trees, in the streets of Baltimore; and providing for a city forester and assistants for that purpose.

Section 1. Be it ordained by the mayor and city council of Baltimore, that the city engineer be and he is hereby authorized and directed to regulate the planting, protection, removing, regulating and controlling of all the trees, growing, planted and to be planted in the streets of Baltimore, not under the jurisdiction of the Board of Park Commissioners, and to appoint a city forester and such other employes and assistants as may be necessary to carry out the provisions of this ordinance. Such forester shall be a person of knowledge and experience in the care and culture of trees.

Sec. 2. And be it further ordained, that it shall be the duty of the city engineer to superintend, regulate and encourage the preservation, culture and planting of shade and ornamental trees in the streets; to prune, spray, cultivate and otherwise maintain such trees, plants and shrubbery, and to trim or direct the time and method of trimming the same; and to take such measures as may be deemed necessary for the control and extermination of insects and other pests and plant diseases which may injuriously affect trees that are now growing or may be hereafter growing in the streets.

The city engineer shall cause all statutes and ordinances for the protection of trees in the streets to be strictly observed.

Sec. 3. And be it further ordained that no person shall plant any tree in any street without first having obtained a written permit therefor from the city engineer setting forth the conditions under which such trees may be planted, including the kind and variety thereof, and until the city forester has designated on the ground the location thereof, and without in all respects complying with the conditions of such permit.

Sec. 4. And be it further ordained, that no person, except the city forester or his assistants, shall spray, mulch, fertilize or otherwise treat, remove, destroy, break, cut or trim any living tree or any part thereof, growing in any street, without first having obtained a written permit from the city engineer; and no cutting or trimming of any tree in any street in connection with the work of any other city department or of any public service corporation or other person having a right to use said street shall be done except in such manner as directed by said city forester..

Sec. 5. And be it further ordained that no person shall fasten any horse or other animal to any tree or shrub in any street; nor shall any person cause or permit any horse or other animal to stand or be near enough to any tree, plant or shrub, to bite or rub against it or in any manner injure or deface the same; nor shall any person attach or place any rope, wire, sign, poster, hand-bill or other thing or substance on any tree or shrub in any street or on any guard or protection of the same; nor shall any person remove, injure or misuse any guard or device placed or intended to protect any tree, plant or shrub now or hereafter growing in any street.

Sec. 6. And be it further ordained, that no person shall, without first having obtained a written permit from the city engineer, attach any electric wire, insulator, or any other device for holding electric wire to any tree now or hereafter growing in any street; and every person or corporation having any wire or wires charged with electricity shall securely fasten or change the location of same so that such wire or wires shall not injure any tree in any street.

Sec. 7. And be it further ordained that no person, firm or corporation owning, maintaining or operating any gas pipe or mains laid beneath the surface of any street or private land in the city of Baltimore shall permit any leak to occur in such pipes or mains within a radius of forty feet of any tree now or hereafter growing in any street in said city, and in the event that a leak exists or occurs in any such pipe or main, it shall be the duty of the person, firm or corporation owning or operating such defective pipe or main to repair the same immediately and stop such leak in a manner so as to prevent a recurrence of the same after receiving a notice in writing from the city engineer calling attention of such person, firm or corporation to the fact that such leak exists or has occurred, and if such person, firm or corporation fails, within five days after the receipt of such notice, to stop such leak in a manner so as to prevent a recurrence thereof, such person, firm or corporation shall be subject to the payment of a fine of not less than ten nor more than fifty dollars, and a separate offense shall be regarded as committed each day during which such person, firm or corporation shall continue such violation, after such notice.

Sec. 8. And be it further ordained, that no person shall, without first having received a written permit from the city engineer, place or hereafter maintain, upon the ground in a street, stone, cement or other substance which shall impede the free entrance of water and air to the roots of any tree in such street, without leaving an open space of ground outside the trunk of said tree, in area not less than four square feet.

Sec. 9. And be it further ordained that no person shall in any way interfere, or cause any person to interfere, with the city forester or his assistants, in and about the planting, mulching, pruning, spraying or removing of any tree in any street, or in the removing of stone, cement or other sidewalk, or stone, cement, or other substance, about the trunk of any

tree in any such street; all of which the said city forester and his assistants are hereby authorized to do.

Sec. 10. And be it further ordained, that in the erection, alteration or repair of any building or structure, the owner or owners thereof shall place, or cause to be placed, in accordance with the directions of the city foresters, such guards around all nearby trees in the street as shall effectually prevent injury to such trees.

Sec. 11. And be it further ordained, that every permit granted by the city engineer shall expire at the end of not exceeding thirty days.

Sec. 12. And be it further ordained, that the word "trees" as used in this ordinance shall not be construed to include shrubs which do not grow higher than fifteen feet, and the word "person," whenever used in this ordinance, shall be construed to include individuals, firms and corporations.

Sec. 13. And be it further ordained, that all ordinances and parts of ordinances heretofore passed which are inconsistent with this ordinance, or any of its provisions, be and they are hereby repealed.

Sec. 14. And be it further ordained that any person violating any of the provisions of Sections 3, 4, 5, 6, 8, 9, or 10 of this ordinance shall be subject to a penalty of not less than one dollar nor more than twenty-five dollars, in the discretion of the court.

Sec. 15. And be it further ordained, that the Board of Estimates of Baltimore City shall provide annually, in the ordinance of estimates, for the salaries, and shall define the duties, of the city forester and his assistants, and the number of such assistants.

Sec. 16. And be it further ordained, that this ordinance shall take effect from the date of its passage.

Approved August 17, 1912.

JAMES H. PRESTON, Mayor.

Method of Proportioning Materials for Concrete Pavements and Sidewalks

The Editor of MUNICIPAL ENGINEERING:

Sir—The following article describes in a general way the method adopted by the city of Aberdeen, Wash., in the proportioning and checking of materials used in the construction of concrete pavements and concrete sidewalks.

In all the concrete pavements and sidewalks laid in this city only screened sand and gravel have been used. This material is obtained from the bed of the Chehalis River, and the pit material is screened and washed before delivery to the scow.

Our pavements are all of two-course construction, consisting for the most part of a 6-inch base and a 2-inch top, the base containing enough water so that when well tamped the surface will flush and none of the mortar will be taken from the top course when it is placed. This base also marks a solid body upon which the workmen can walk in spreading the 2-inch top, doing away with any chances of the workmen tramping holes in the base and allowing them to fill up with the surface mortar, thus insuring a straight two-course pavement. The top course is mixed as a very soft mortar that is easily rodded to the shape of the crown desired.

In our lower course we call for one sack (94 pounds) of cement to be used in each 12 square feet of 6-inch base in place. This is based on one sack of cement to each 6 cubic feet of mixed concrete, sand and gravel to be proportioned as 3 to 5, or as directed. The "as directed" clause is placed in our specifications for the reason that our materials vary as to fineness, making it necessary to often shift our proportions of sand and gravel as they require.

In our 2-inch top course we call for one sack of cement in every 14½ square feet of 2-inch top in place, aggregate mixed 1 sand to 2 pea gravel, or as directed.

The inspector can, by keeping the sub-grade, base and top to the required thickness at the time they are placed, compute the amount of cement used against the amount required under the specifications. On work where a boom mixer is used the inspector takes a check on each move of the mixer, which is about every 20 feet.

In our concrete sidewalk construction we call for one sack of cement to be used in each 24 square feet of 3½-inch concrete base in place, aggregate proportioned 1 sand to 2 gravel, or as directed. This is based on one sack of cement to each 7 cubic feet of mixed concrete. In place of calling for a straight proposition on the ½-inch top for sidewalk work, that is, 1 cement to 2 sand, we limit the contractor to one sack of cement (94 pounds) to be used in each 15½ square feet of sidewalk in place, top and bottom included; the top to be composed of sand and cement in such proportions as will not exceed the limit as set out in the specifications for the distance that one sack of cement will run. For the most of the sands which we have used we have found that this is very close to a 1-to-2 proportion.

This system of specifying how far a sack of cement shall run in concrete pavement and sidewalk construction, we have found has some good advantages from an engineering point of view.

First: We have found that we can handle a job with only one inspector, where, in many cities using the other method of mixing, that is, straight proportions, they are using two inspectors, one at the mixer and one at the grade where the concrete is being placed.

Second: From this method of specifying, the contractors in making up their bids can compute the amount of cement that is actually required on any certain piece of work, and it also guards against the contractor shaving his price at the time of letting the contract on the theory that he can run a leaner mixture than is called for.

Third: The inspector on the work, after once adjusting the proportions of sand and gravel desired, has left the watching of the cement, the empty cement sacks, the sub-grade and the placing of the concrete, and by measuring up the base at intervals, can at once detect any change in the proportions of sand and gravel.

During the last two years we have placed some 26,000 square yards of two-course concrete pavement and 17,000 square yards of concrete sidewalks under this type of specification, and we find that this method is giving us good satisfaction.

LOUIS D. KELSEY, C. E.,
City Engineer, Aberdeen, Wash.

Where Good Roads Are Not Wanted

The Editor of MUNICIPAL ENGINEERING:

Sir—This county has never gone into road building to any extent, and the 7 miles of grading I have shown on the accompanying blank will be done by private subscription. With the exception of the southwestern part of the county, which is under the —— irrigation project, this is a ranching country, and practically no farming is done. It is cut up into one-section tracts and these have gradually been going into the hands of moneyed men, so that at the present time the county is pretty generally cut up into ranches of from 4 to 20 sections. Naturally, these people do not care for roads on account of cutting their holdings in two. I am of the opinion that there is not to exceed 100 miles of fenced roads in the county, with the exception of the southwestern part above referred to, and this is the fourth largest county in the state in point of area.

As to bridges, will say that we may put in a dozen steel

girder bridges and we may not put in any at all. If we have plenty of high water this spring and it takes out one or more, they will be replaced with steel bridges, with concrete abutments.

As to sidewalks, ———— is the only town in the county, and, as its population is not to exceed 425, the sidewalk proposition does not worry us much. However, what walks we have are of concrete. We have no paving, except what nature gave us.

As to road signs, will say we may put up a few wooden ones, if the local commercial club ceases to hibernate.

We have no county engineer, and as our county surveyor lives some fifteen miles out of town and never visits us unless he is wanted to locate some corner to settle a fence quarrel, I have taken the liberty of writing this in response to your request for information. I have been mixed up with commercial clubs in other towns and am strong for good roads, but as I find it is poor "politics" here, I have to keep pretty well bottled up and seldom get a chance to "uncork."

————, County Clerk.

El Oso Asphalt

The Editor of MUNICIPAL ENGINEERING:

Sir— In answer to query concerning El Oso asphalt in your March number, I will say that this brand was sold by Mr. Blake, who was the originator of asphaltic concrete pavement. I met Mr. Blake at Wellington, Kas., when I was city engineer. He was then promoting asphaltic concrete paving, which was quite new. The early literature circulated by Mr. Blake about this form of paving recommended El Oso asphaltic cement. Since his death I think there has been none upon the market.

H. A. ROWLAND,
McPherson, Kas.

It seems to have appeared in one or two places recently, but apparently not in such way as to receive advertisement.

Politics and the City Manager in Phoenix

The Editor of MUNICIPAL ENGINEERING:

Sir—What may happen when politics gets into the new forms of government is exemplified in Phoenix, Ariz., where charges and countercharges of inefficiency and incompetency are flying and there is a contest between old and new city managers for the office.

The city commissioners discharged city manager W. A. Farish, who denies their authority to do so under the terms of the resolution and refuses to give up his office to his appointed successor.

Mayor George U. Young belongs to the Progressive party and is opposed by prominent Republicans, one of whom files charges against him. Commissioner Peter Corpstein is a Democrat who is facing charges filed by a prominent Democrat.

The trouble began when City Manager Farish proposed to discharge the chief of police and appoint a Democratic politician in his place. The commissioners then discharged him and named Robert Cray to succeed him.

At present the charges against the city manager are failure to manage the fire and police departments successfully, $15,000 increase in expense of operating the city for six months beyond that under the aldermanic form, failure to bond street railway to repair damage caused by building lines in the city, acceptance of inferior fire hose substituted under a contract. Charges against the mayor are incompetence, lack of practical ability in city government, lack of sympathy with the commission-city manager form of government, conspiracy with the other commissioners to destroy the city manager's usefulness and make him subservient to the will of the commission, and attempting to dictate appointment and discharge of city officials and employes. Similar charges are made against the other commissioners and the recall of all three of them is demanded by many citizens.

The clearing up of the muddle and the placing of all parts of the city government on an efficiency basis seem difficult to accomplish, but strong effort by public spirited citizens working for the public benefit and not for party advantage could be successful.

K.

Box Car Unloaders and Conveyors

The Editor of MUNICIPAL ENGINEERING:

Sir—Your issue for February, 1915, publishes, on p. 113, an inquiry about box car loaders and conveyors. This inquiry evidently refers to handling raw materials in a glass works, and as we are manufacturers of such apparatus—in fact are referred to in your reply—we take the liberty of sending you print of our drawing to forward to your correspondent.

The plan is to unload the materials from the box cars by means of a power shovel into the foot of the elevator. From the elevator the material is distributed by means of spouts to two sand bins, while the lime and soda are transferred by means of a screw conveyor into their respective bins. Underneath the bins in a tunnel is a scale car, which draws the sand, lime or soda off thru the undercut gates and carries the total quantity to a second elevator, and this elevates it and puts it into the rotary mixer. After being tumbled in the drum of this machine for a time, the mixed materials are dropped again into the foot of the elevator, lifted, carried up and discharged onto the 46-foot belt conveyor, which runs diagonally over to the storage over the melting tanks. The mixed material is, of course, dumped at the time when the scale car is collecting its materials, and the two operations do not conflict in any way.

For large plants we sometimes make the scale car carry the mixing drum, so that the materials can be mixed while the car is in transit. In other plants the materials can be collected by means of a belt to the stationary scale and mixer.

Details can be worked out to suit local arrangements.

CHIEF ENGINEER.

W. A. FARISH, *former city manager of Phoenix, Ariz.*

GEORGE U. YOUNG, *mayor of Phoenix, Ariz.*

MISCELLANEOUS

Canadian Bitulithic Patents Sustained

Final judgment has been rendered by Mr. Justice Hyndman, of the Supreme Court of Alberta, in the case of Bitulithic & Contracting Ltd. and Warren Brothers Company vs. Canadian Mineral Rubber Company Ltd. and the City of Calgary. This suit was brought for an infringement of the basic Canadian patent of Warren Brothers Company for the wearing surface of a street pavement. The defendants in their answer denied both the validity of the patent and also the fact of the infringement.

The contract was let by the city of Calgary to the Canadian Mineral Rubber Company to construct 100,000 square yards of pavement, which, as the specifications provided, should be "identical with a pavement which the plaintiffs, Bitulithic & Contracting Ltd., had laid down in Calgary in 1910 and 1911."

At the time of letting the contract the city required the contractor to file a surety company bond in the sum of $75,000 indemnifying the city against loss by reason of infringement.

Construction of the work was begun by the contractor and the suit in this case was commenced by application before Justice Stuart for the issuance of a preliminary injunction. In view of the fact that the streets of the city were then in a deplorable condition and required improvement, and that the work had been commenced, the issuance of a preliminary injunction restraining the further prosecution of the work at that time was refused. The defendant, however, was required to pay into court the sum of $3,000 as punitive damages if the patent in suit upon final hearing should be found to be infringed, and was also required to file with the court a surety bond in the sum of $60,000 to secure any damages which the plaintiff might recover by reason of the infringement of his patent, trade-mark and copyright. The city also retained out of the moneys due the defendant for work done approximately $21,000 as further protection against any liability for damages under the pending suit. The work under the contract was finally completed in the summer of 1914.

The court said:

"There is ample testimony which establishes infringement. * * * The specifications used were similar to those of the plaintiff in laying the 'bitulithic.'"

The court further held that:

"The validity of the patent must be decided according to the state of knowledge at the date of the patent. * * * I cannot find that there had been any pavements similar in construction to that of the plaintiff. It is quite true that density and stability had been for many years considered most desirable, and in fact were sought to be accomplished in various countries, but there does not appear to have been any fixed or known working scheme which would insure it with any degree of certainty."

After describing the nature, structure and defects of the various kinds of pavements known, and in use at the time of the Warren invention,—"the old familiar macadam, tar macadam, tar concrete for sidewalks and sheet asphalt"—the court says:

"It appears without doubt that the great object in view was the production of a pavement with the least number of voids, with inherent stability, waterproofness, resistance to wear, as well as being dustless, noiseless and sanitary and free from liability to fracture."

In defining the scope of the Warren patent the court says:

"His invention was the discovery that an aggregate of large and small pieces of stone graded down to an impalpable powder mixed together in certain proportions would produce a mixture having less than 21 per cent. of voids and when so assembled and compacted together would form a dense, solid, homogeneous body with the smallest percentage of voids and possessing the highest degree of stability and one in which the largest and smallest pieces are associated with each other indiscriminately thruout the structure and one which because of the sizes of the pieces and their arrangement with respect to each other offers the smallest areas of surfaces for the attachment of the plastic composition to them so that not only is a superior binding effect or union obtained but a smaller quantity of the plastic composition is necessary for the purpose of obtaining the superior result or product. A good deal of evidence was given on the subject of stability. It is not claimed by the inventor that his mineral aggregate has absolute or perfect stability, but merely a high degree or greater than any other known pavement." * * *

"It seems to me from the evidence that, altho it might be admitted that other pavements, e. g., macadam, may possibly possess as great a density and great stability, still the process is altogether different and full of uncertainty. There was no way of ascertaining the density until after it was laid and treated and rolled on the street. The bitulithic as to all these features is prepared and may be known in advance and is laid down with at least an approximate certainty of its density. The inventor reduced the composition of the mineral aggregate to a certainty which before was uncertain and usually mixed in a haphazard way "hit or miss," as Engineer Craig put it, and this both as to quality and quantity of mineral ingredients.

With regard to the sufficiency of the specifications set out in the patent, about which some question had been raised, the court said:

"The very fact that the defendant company was able to successfully construct the pavement under their contract without apparently any difficulty tends to prove this very point."

As to the utility of the invention, the court says:

"There is ample evidence that it is a very useful invention and, according to City Engineer Craig and other witnesses, the bitulithic pavement is a highly satisfactory one.

"I therefore find that the patent is valid and has been infringed—and the plaintiffs entitled to an injunction. There

will be a reference to the clerk of the court to ascertain what damages the plaintiffs have sustained by reason of such infringement" and for costs.

This is the first decision involving the validity of any of the Canadian bitulithic patents, and it follows that of the United States Circuit Court of Appeals for the Sixth Circuit, in the Owosso case, which has been recognized and followed by five of the nine circuits in the United States.

Pan-American Road Congress

Preliminary plans were completed at a meeting in Montpelier, Vt., March 18 for what promises to be the largest gathering of good roads advocates ever held. This meeting will be held at the Panama-Pacific International Exposition, and will be known as the Pan-American Road Congress. It will be under the joint auspices of the American Road Builders' Association and the American Highway Association. The tentative date selected is that of the week of September 6.

The plans for the forthcoming congress will be handled by an executive committee of five. This committee is made up of Governor Charles W. Gates, of Vermont, chairman; W. W. Crosby, former state highway engineer of Maryland, and E. L. Powers, editor of "Good Roads," representing the American Road Builders' Association, and James H. MacDonald, former state highway commissioner of Connecticut, and J. E. Pennybacker, chief, Division of Economics, U. S. Office of Public Roads, representing the American Highway Association.

Governor Gates was elected the fifth member and chairman of the committee by the other four members. Sub-committees were appointed as follows: finance, Jas. H. MacDonald; program, W. W. Crosby; publicity, E. L. Powers, and arrangements, J. E. Pennybacker.

The organizations under whose auspices the joint congress will be held are the two leading good roads associations of the United States.

Governor Gates for ten years or more was the state highway commissioner of the state of Vermont, and his record in that office produced one of the largest majorities ever given a governor in that state.

The executive officers of the American Road Builders' Association are as follows: President, George W. Tillson, consulting engineer to the president of the Boro of Brooklyn, New York City; first vice-president, A. W. Dean, chief engineer, Massachusetts Highway Commission; second vice-president, Austin B. Fletcher, state highway engineer of California; third vice-president, S. Percy Hooker, state superintendent of highways of New Hampshire; secretary, E. L. Powers, editor *Good Roads;* treasurer, W. W. Crosby, former state highway engineer of Maryland.

The executive officers of the American Highway Association are as follows: President, Fairfax Harrison, president Southern Railway Company; vice-president, Logan Waller Page, director U. S. Office of Public Roads; chairman board of directors, James S. Harlan, chairman Interstate Commerce Commission; chairman of executive committee, Leonard Tufts; treasurer, John Burke, treasurer of the United States.

Syracuse Pavement Guaranty Reduced to Five Years

An ordinance providing that the time guaranty on all pavements in the city be reduced from ten to five years has been passed by the city council of Syracuse, N. Y. The passing of the ordinance is a victory for Mayor Will, for he had been striving for weeks to see that it went thru.

Alderman Davis of the Ninth Ward did his best to see that the ordinance was defeated. A similar ordinance was passed during Mayor Schoeneck's administration and Alderman Davis recited the words which Mayor Schoeneck used in vetoing the ordinance to support his position.

Alderman Davin supported the ordinance, declaring that the only objection to it came from those who would restrict the competition in the building of pavements in the city. He declared that the reduction in the time guaranty would mean that contractors from other cities who at present were prevented from taking contracts would come to the city.

Chairman Quick of the Chamber of Commerce committee on paving addressed the council, saying that the best engineers in the country were agreed that the five-year guaranty for pavements was correct and that his committee strongly recommended that the ordinance be passed by the council.

The Good Roads Year Book

Six states, namely, Illinois, Kentucky, Massachusetts, New Jersey, New York and Wisconsin, now have civil service laws providing for appointment of highway engineers and employes in accordance with the merit system. A description of the system in effect in each of the six states appears in the Good Roads Year Book just issued by the American Highway Association at Washington. The summary of automobile legislation in all the states is of timely interest in view of the fact that nearly 1,900,000 automobiles were registered in the United States during 1914, for which more than $12,000,000 in license fees was paid.

A majority of the states are now trying out the plan of working convicts on public roads. In some states the honor system prevails and guards are partially or wholly dispensed with. In other states guards are deemed essential, and between the two systems much controversy rages. The Year Book, with its complete digest of convict labor laws for all the states and its many references throw much light on the subject. That convict labor will go far toward solving the road problem is demonstrated by the experience of Georgia with its army of nearly six thousand road convicts and Virginia with about fifteen hundred. The progress reports from these two states appearing in the chapter devoted to highway progress show remarkable gains in mileage of improved roads.

The American Highway Association finds the Year Book one of its most effective mediums for carrying on the campaign for efficient and adequate improvement in the construction, maintenance and administration of the public roads.

Technical Associations

The ninth annual convention of the Illuminating Engineering Society will be held at the New Willard Hotel, Washington, D. C., September 20-23 inclusive. E. S. Marlow, of the Potomac Electric Power Company, Washington, D. C., is chairman of the convention committee.

The "electrical prosperity week" celebration will be held everywhere the first week in December under the auspices of the Society for Electrical Development.

The International Engineering Congress, to be held at the San Francisco Exposition September 20 to 25, 1915, will be preceded on September 16 to 18 by the meetings of four of the American engineering societies under whose auspices the congress is held, viz: The American Society of Civil Engineers, the American Institute of Mining Engineers, the American Society of Mechanical Engineers and the American Institute of Electrical Engineers. Arrangements have been made for a special train leaving New York September 9 by the New York Central for passage, on which application should be made to G. S. Hamer, passenger agent, 1216 Broadway, New York.

At the sixth annual meeting of the New York State Conference of Mayors and Other City Officials, to be held in Troy,

June 1, 2 and 3, a municipal exhibit will be held, consisting largely of implements and manufactured wares most commonly used and purchased by municipalities. Motion pictures of municipal activities are solicited from the various cities of the state. C. R. Metzger, general secretary of the Troy Chamber of Commerce, is secretary of the committee having the matter in charge. W. P. Capes, 105 E. 22d St., New York, is secertary of the conference.

S. J. Hoexter, Ann Arbor, Mich., is secretary and treasurer of the Michigan Engineering Society.

The Civic League of St. Louis, Mo., has issued its thirteenth year book for 1914-15. The recital of its activities shows that it is a power for civic betterment in its community and the program for its future activities shows that it is not averse to attempting the solution of large problems. Its past success insures measurable attainment of its objects.

At the meeting of the New York Electrical Society March 25, T. Commerford Martin gave an address on "Electrical Aspects and Lessons of the San Francisco Exposition," with some consideration of the lighting of the San Diego Exposition.

The Brooklyn Engineers' Club on March 11 listened to an illustrated paper by Frank W. Skinner on "Underpinning, Raising and Moving Structures," and on April 8 to M. H. Freeman and J. F. Sanborn, on "Grouting the Shafts, Tunnels and Other Structures of the Catskill Water Supply System."

The Cement Products Exhibition Co., after its experience with the 1915 cement show, has secured the First Infantry Armory in addition to the Coliseum and its Annex for the 1916 Chicago Cement Show.

The National Municipal League has established an annual prize of $20, called the "Cincinnati Prize," to be awarded to the student in any department of the University of Cincinnati who submits the best original essay on a subject bearing upon the municipal government or the civic life of the city of Cincinnati. The subject selected for the 1915 composition is "The Transportation Problem in Cincinnati."

Charles V. Eades, with the Standard Asphalt and Rubber Company, will speak on "Waterproofing and Insulation" before the Colorado Association of Members of the Am. Soc. C. E., April 10.

Civil Service Examinations

The U. S. Civil Service Commission will hold examinations at the usual places as follows:

April 20: Gas waste engineer, Bureau of Mines, Department of Interior, at $2,400 to $3,600 a year.

April 28-29: Surveyor-draftsman in Forest Service, Department of Agriculture, at $1,200 to $1,500 a year; hull draftsman in office of Chief of Engineers, War Department, at $1,800 a year.

May 12-13: Inspector of machinery, Electric Boat Co., Groton, Conn., at $5.04 a day.

Technical Schools

Horace M. Swetland, president of the United Publishers' Corporation, delivered a lecture on March 24 in the series on industrial journalism given at New York University under the auspices of the New York Trade Press Association. Mr. Swetland has owned or now owns thru various organizations, journals in the automobile, iron, dry goods, power, architectural, municipal, engineering and mining fields, and speaks with a large measure of authority.

Bulletin serial No. 709 of the University of Wisconsin is on Public Recreation, prepared by the Extension Division, price $1.

Professor W. M. Wilson, of the department of civil engineering of the University of Illinois, recently presented a paper before the Western Society of Engineers on "Wind Stresses." The new method of computing wind stresses, which has been developed by Professor Wilson and Mr. G. A. Maney, was described in this paper, and comparisons were given of the wind stresses in a twenty-story building as figured by various approximate methods and by the proposed new method.

Bulletin, serial No. 721, of the University of Wisconsin, contains the program of the first national university extension conference, held at Madison, Wis., March 10-13.

Methods and apparatus have been developed by the department of physics of the University of Illinois whereby the reflection, absorption and transmission of sound for different materials may be tested experimentally. A large basement room in the physics laboratory, with cemented walls, ceiling and floor, serves as a resonance chamber for the absorption tests, while a specially constructed resonator and organ pipe are used to measure the reflection and the transmission. The work has been developed by Dr. F. R. Watson, under whose direction the correction of the acoustic properties of the university auditorium was so successfully carried out. This equipment is to be used in connection with a proposed course of instruction in architectural acoustics.

Professor C. R. Richards, of the department of mechanical engineering of the University of Illinois, has designed a hydraulic absorption dynamometer, several of which have been built in the college shops. One is to be connected to the new 60-h.p. six-cylinder Peerless automobile engine in the mechanical engineering laboratory.

The engineering experiment station of the University of Illinois is conducting tests of various building materials to determine their coefficients of heat transmission. The work is being done by L. C. Lichty, Research Fellow, under the direction of Professor L. A. Harding of the department of mechanical engineering. The results of the tests are expected to be of especial value to heating and ventilating engineers.

The Manitoba Engineer is the annual publication of the Engineering Society of the University of Manitoba, at Winnipeg.

Personal Notes

H. B. Pullar, recently of the H. B. Pullar Company, asphalt chemists, Detroit, Mich., has become the general manager of the new Pioneer Asphalt Company, producers of "highest quality asphalt products," at Lawrenceville, Ill.

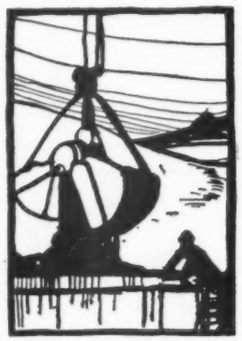
W. G. Kirkpatrick has resumed practice as consulting engineer, specializing in hydraulic and municipal work, with offices in Birmingham, Ala.

John H. Neef was appointed city engineer in addition to his duties as superintendent of streets and public improvements in Hoquiam, Wash., under the city commission which took office December 21, 1914, thus saving one official, as Mr. Neef is one of the elected city commissioners.

Walter A. McFarland, for nearly nineteen years the superintendent of the water department of the District of Columbia, Washington, D. C., died of pneumonia on March 17. Mr. McFarland's high reputation as an engineer was established by his work in reorganizing the water department of Washington and rearranging the water distribution system of the city to fit that rapidly growing and beautiful municipality.

Walter L. Hempelmann, for the past eight years superintendent of bituminous roadways for the street department of St. Louis, Mo., has resigned to take a position with John Baker, Jr., dealer in asphalt and asphalt products in his Chicago office.

Professor W. K. Hatt, of Purdue University, gave his lecture on "Flood Prevention in Indiana" before the faculty and students of the College of Engineering of the University of Illinois.



MACHINERY AND SUPPLIES

Durability of Bitulithic

Reports from Rome, N. Y., state that, as usual, after the winter season, a great many repairs will have to be made to the city's brick and asphalt pavements as soon as the weather will permit. They show the effects of wear and tear from the action of the frost, which gets in through the many cracks and heaves the pavements. There is a strong object lesson between these kinds of pavements and bitulithic, the first mile of which was laid in North James street thirteen years ago. In spite of the very heavy traffic over that street to the plant of the Fort Stanwix Canning Company, the fair grounds, Oneida County Home and Hospital, this pavement is practically as good today as when laid. The brick and asphalt have been a source of expense, while the bitulithic has cost nothing. Rome has standardized on this, and nothing but bitulithic has been laid in the city since 1904. As Mayor H. C. Midlam said in his last annual message to the Common Council: "The confidence of the public in bitulithic pavement is fully justified." In the many miles of this pavement in the city there is not a crack.

Gasolabra for Modern Ornamental Street Lighting

"Gasolabra" is the word adopted by the manufacturers of the ornamental gas cluster standards which are creating so much favorable comment thruout the United States, and especially in cities and towns where natural gas is delivered.

Gasolabra are manufactured by the Sun Street Light Company of Canton, Ohio. In the city of Canton, Ohio, so well known thruout the country as "McKinley's Town," there are some 150 five-way ornamental cluster standards of this gasolabra type. The city itself does not contribute to this very beautiful and efficient ornamental lighting of its business sections, as that expense is at present borne by the business men and merchants themselves. It is remarked by visitors to Canton that these gasolabra produce a great deal more efficient and better quality of illumination than similar types of ornamental standards which use electric bulbs inside the globes.

Altho the city of Canton does not at the present time contribute to the expense of the ornamental lighting of the business sections of the city, yet it is now taking under consideration the adoption of these splendid ornamental illuminants for an extended "Gas White Way" in other parts of the city, and the citizens in general are clamoring for such an extension of ornamental lighting.

In the city of Canton the Sun Street Light Company commenced with about fifteen standards in front of some of the enterprising business blocks, and in a very short time the number was increased to over one hundred and is steadily increasing in the business sections.

The accompanying photograph will give an excellent idea of the ornamental appearance and brilliancy of these gasolabra in one of the busy business sections of Canton.

Medusa Waterproofing Paste

To meet a growing demand and preference among architects and cement users, for a waterproofing which can be dissolved in the water to be used in mixing mortar or concrete, Medusa waterproofing has been perfected in paste form by the Sandusky Portland Cement Company, Sandusky, Ohio.

The only difference from regular Medusa waterproofing is the greater ease and convenience of mixing which the paste form offers. In consequence of this, perfect waterproofing effect is more certainly obtained with the paste than with the powder, altho if the mixing of the powder with the cement is thoroly and carefully done, equally good results can be obtained with either form.

Medusa waterproofing paste is shipped in square cans, with large friction seal, of 1 gallon (8 lbs.) and 5 gallons (40 lbs.) each, packed for shipment in substantial crates of 6 one-gallon or 2 five-gallon cans each.

The Medusa waterproofing paste is to be dissolved in the water with which concrete or mortar is to be mixed. To obtain easy solution, use soft and slightly warm water. Hard water tends to precipitate the paste in a curdy form; however, the addition of a slightly increased quantity of the paste

will overcome this trouble. Cold water, below 60 degrees F., also dissolves the paste with difficulty.

To save time and labor in dissolving, empty the paste from the can into a pail or tub, add an equal volume of water, and stir thoroly until a smooth cream is formed; then add this mixture to the balance of the water to be used.

A barrel of Portland cement requires about 20 gallons of water to make 1:2 mortar or 1:2:4 concrete. For best waterproof qualities, 1 gallon of waterproofing paste, or 8 lbs., should be used to each barrel of cement. One gallon of paste is therefore to be dissolved in approximately 20 gallons of water, this volume of water to be varied as found necessary to give a soft plastic concrete which may easily be made to flow into all parts of the forms by slight spading, without ramming.

A cubic yard of concrete, 1:2:4, requires 1½ gallons, or 12 lbs., of waterproofing paste, for best results. This corresponds to 2 per cent.. of the weight of cement used, which is always recommended. It is, however, understood that when extreme resistance to water is not essential, or in the case of large masses of solid concrete, the amount of waterproofing paste may be reduced to 1½ per cent., or even to 1 per cent. of the weight of cement used.

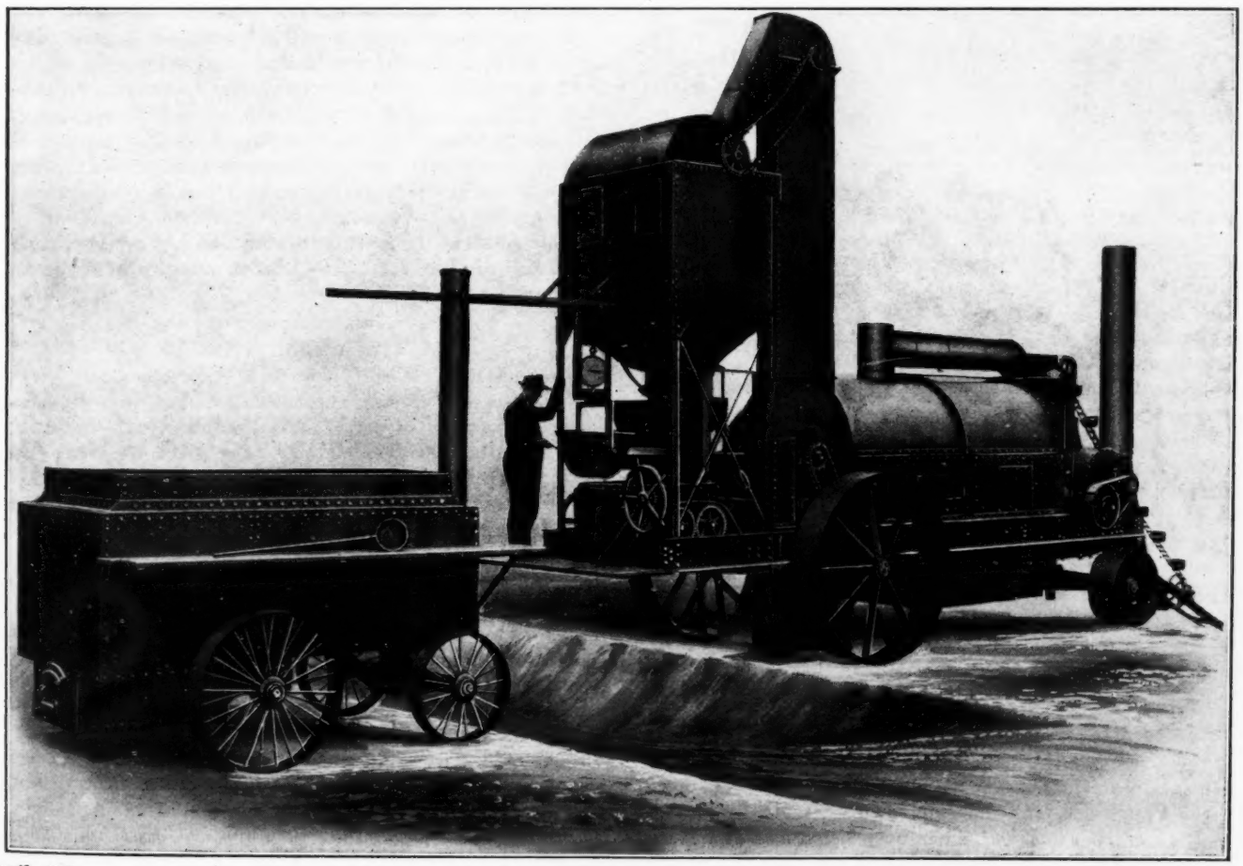
The Hetherington & Berner Road Plant

The accompanying illustration shows the new Hetherington & Berner road plant as it appears when established in the field all ready for manufacturing paving mixtures. This plant embodies a sand drum which has in its design and construction several important improvements and by means of which much greater capacity can be obtained than could be had from a drum of this size of the ordinary type. In the outfit as here shown the plant mechanism is in the simplest possible form; a trolley rail extends from the side of the storage bin over the melting kettles and the hot asphaltic cement is ladled by hand from the kettle into the asphalt bucket. For those who prefer to have this material handled by mechanical means another method is used. The overhead storage bin provided with this plant is sub-divided and arranged so that any kind of bituminous paving mixtures may be made, as well as ordinary sheet asphalt. As here shown, the dryer wagon and the kettle wagon are set in line with each other and sufficiently separated so that a driveway for carts is provided between the two, after the plan used in the original Hetherington two-car railway plants, excepting that in the case of this portable road plant the driveway is lowered below grade two feet. This plant is designed in two units, a melting-kettle unit and a dryer unit, in order that the weight may be divided and neither unit be too heavy to be practicable in getting over ordinary roads.

NEW PLANT *for making bituminous paving mixtures which can be hauled over ordinary roads and set up anywhere with a minimum of labor and time.*

Grouting Brick Pavements

It was long thought that the cement grout for filling the joints in brick pavements could be applied only by hand, but of late the Marsh-Capron Company have devised a machine which is thoroly dependable and is approved by the leading paving contractors and paving brick manufacturers. The Marsh-Capron grouter is built for service, is simple in design, sturdy in appearance, and of rigid, honest construction. It is operated by a 2-h.p. gasoline engine of approved type, which engine is protected by a steel house. It has extra wide-rimmed, strong wheels, and five points at which the weight of the ma-



chine is distributed, insuring against vibration and the loosening up of the brick from the cushion.

The frame is constructed of steel channels, braced and reinforced. The drum is of boiler plate, with blades and buckets so arranged as to give an excellent mix. It is driven by cut steel gears, no chain.

The machine stands 5 feet 6 inches high, is 51 inches wide, and weighs approximately 1,000 pounds.

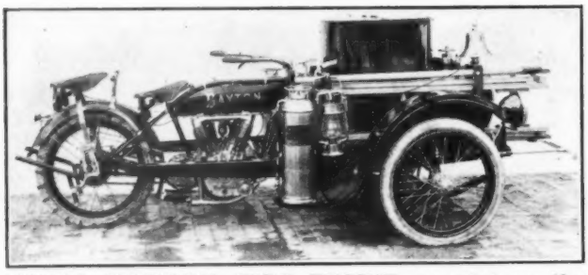
Particular attention is called to the chute, which is furnished at the bottom with a plate, perforated with thirty 1-inch holes—a convenience best realized by those who have seen the machine at work.

The Marsh-Capron Manufacturing Company, 461 Old Colony building, Chicago, will send full particulars about it.

A Valuable Addition to the Fire Department

Statistics show that 80 per cent. of all the fires in the United States are extinguished by chemicals. The general adoption of a small chemical automobile machine would increase this percentage considerably, as the most essential part of successful fire fighting is to get at the fire at the start. The Dayton tri-car chemical can get to a fire sooner than a heavier motor driven apparatus, and very much sooner than horse-driven apparatus.

The size of the machine enables the driver to drive between buildings, on sidewalks, thru narrow allys, as well as on rough country roads or streets. There is great advantage in a machine of this sort where colleges, insitutions or factories are located beyond the reach of the water works, as is often the case in the smaller towns.



SMALL CHEMICAL FIRE ENGINE *mounted on three-wheeled automobile, which is very convenient and valuable in both small and large fire departments.*

The method of driving this machine by the third or rear wheel is the same as that adopted by the United States government in parcel post duty, and makes it possible to traverse rougher roads, for the reason that this wheel is between the regular tracks which are caused by heavy wagons or trucks and gives better driving power. A very important feature is that the controls and engine are very nearly the same as the motorcycle, therefore it requires no expert to run a machine as there are motorcycle drivers in any village or town.

The machine can be stored in a small garage, not requiring the extra expense of building a special engine house.

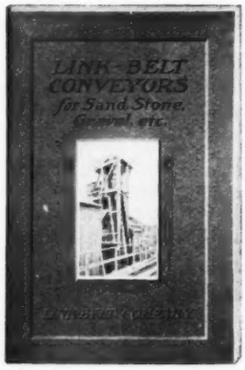
The accompanying photograph gives a side view of this valuable addition to any fire department, but especially to the small fire department. Indeed, it may fill the place of a fire department entirely in small towns with little or no water supply.

Minerva Waterproofing

Minerva waterproofing is a white paste which is mixed with the water used for tempering concrete, cement mortar or cement stucco, and is thus held in suspension and distributed uniformly thru the mass. The tensile strength and consistency of volume of the cement are not affected.

The weight is the same as that of water, so that the proportions for mixing can be measured either by volume or by weight. The proportion of Minerva to be used in the mortar is by weight, however, the amount required being 2½ per cent. of the weight of cement or less according to the use to which the mortar is to be put, for mortar or concrete. Two per cent is sufficient for cement stucco and one per cent for a cement wash. F. William Stocker, Inc., 1031 Clinton street, Hobokon, N. J., are the manufacturers.

Conveyors and Loaders for Contractors



The little book, the cover of which is shown in this photograph, is of much interest to contractors, especially those handling quantities of stone, gravel and sand, for it shows a large number of installations of conveyors from continuous elevators with capacity of 600 tons an hour down to 2 tons per hour and all their parts, belt carriers for like materials to and from bins and cars, sand, gravel and stone screens.

It shows the efficient Link-Belt wagon loader, which is simply a conveyor of similar type carried on a three-wheel carriage. This machine loads auto trucks fast enough to make it pay to use them for hauling concrete material. It may be fitted with two chutes so that it can discharge into wagon or wheelbarrow at the same time. By fitting the loader with rotary screen, belt conveyor and chutes it can be used at the same time for screening and loading with saving of time and expense of one operation.

One form of the loader is constructed specially for handling sand. Another is self-propelled for short distances.

The locomotive crane, a car unloader traveling on a special track running parallel to the train of cars to be loaded, a stationary car unloader to be located at a stationary paving plant or storage area, are also illustrated, as well as the Twentieth Century portable asphalt paving plants, which have capacities of 500 and 800 square yards per 9-hour day.

The Link-Belt Company will send this booklet if request is made for Book No. 189 of the nearest office or of the general office in Chicago, Ill.

Trade Publications

The decision of the New York Supreme Court on the Rochester case regarding specification of patented pavements, which was quoted in part in the December, 1914, number of MUNICIPAL ENGINEERING, has been reprinted by Warren Brothers Company, Boston, Mass., together with the brief of attorneys for the defendant contractor and the corporation counsel of Rochester, and copies can be obtained on request by interested parties.

The Koehring mixer publication, winter number, has been issued.

The Sun Street Light Co., Canton, Ohio, issues a handsome illustrated catalog of the "Sun" gasolabra for ornamental street lighting of various artistic designs, in which the modern high-candle-power gas burners give high efficiency also.

The Philadelphia Wood Paving Block Co., 1225 Filbert St., Philadelphia, Pa., has issued some new circulars regarding the Acme non-slip wood paving block, giving full information about it and photographs of blocks and streets laid with them.